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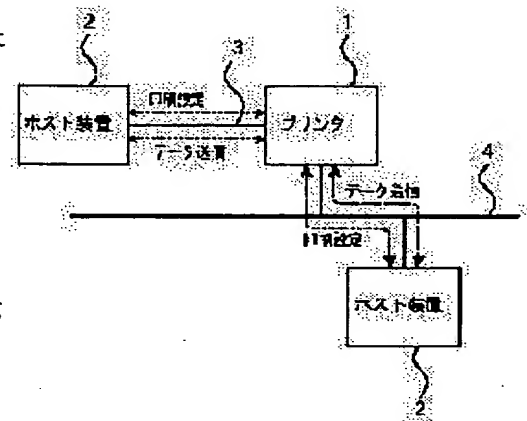
(72)Inventor : ISHIDA GORO

(54) PRINTER, PRINT CONTROL METHOD, AND RECORDING MEDIUM WITH RECORDED PROGRAM

(57)Abstract:

PROBLEM TO BE SOLVED: To print document data on a host device by a printer without requiring any printer driver by interrupting printing when print interruption information is received from the host device while the printing is carried out according to data to be printed.

SOLUTION: The host device 2 once receiving command data regarding a data request reads out data of a print object according to the specification of parameter data and sends command data regarding data transmission to the printer 1. The host device 2 sends command data regarding page process interruption to the printer 1 in response to a user's indication or error occurrence. The printer 1 when performing a printing process interrupts the process. The printer 1 outputs command data regarding object release to the host device 2 as to all print objects. The printer 1 sends command data regarding the end of the page process to the host device 2.



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CLAIMS

[Claim(s)]

[Claim 1] The data for printing specified for reception and said printing setting-out information in the printing setting-out information sent from host equipment are required of said host equipment. The data for printing sent from said host equipment according to said demand Reception, The printer which is a printer which prints based on said printing setting-out information and said data for printing, and is characterized by interrupting said printing when printing interruption information is received from host equipment while printing based on said data for printing.

[Claim 2] The 1st reception means which receives the printing setting-out information sent from host equipment, A demand means to require the data for printing specified for said printing setting-out information of said host equipment, The 2nd reception means which receives the data for printing sent from said host equipment according to said demand, A generation means to generate the bit map data based on said data for printing based on said printing setting-out information, The printer which is a printer equipped with a printing means to perform printing to a printing record medium based on said bit map data, and is characterized by interrupting said printing when printing interruption information is received from host equipment while printing based on said data for printing.

[Claim 3] Said printer is a printer according to claim 2 characterized by sending the information about said printing processing termination to said host equipment when said printing is interrupted.

[Claim 4] The data for printing specified for reception and said printing setting-out information in the printing setting-out information sent from host equipment are required of said host equipment. The data for printing sent from said host equipment according to said demand Reception, The printing control approach which is the printing control approach of the printer which prints based on said printing setting-out information and said data for printing, and is characterized by interrupting said printing when printing interruption information is received from host equipment while printing based on said data for printing.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the technique of a printer. Moreover, this invention relates to the technique of the processing control based on the specific command system used by the communication link between host equipment and a printer.

[Description of the Prior Art] In order for the host equipment represented by the personal computer to make a printer print an application data, host equipment needs the printer driver (program for printer control) prepared for every printer. If an application data is received from an application program, a printer driver will be changed into the print job data of a printer proper, and will be outputted to the printer. If these print job data are received, a printer will interpret this, will generate the bit map data of a raster format, and will realize the print to a print sheet.

[0002] Moreover, in typical information processing system, electronic equipment, such as a printer, and a scanner, a digital camera, is arranged to the perimeter centering on host equipment. The host equipment with which the driver (device driver) of the proper for every electronic equipment was incorporated mediates information among these electronic equipment. For example, on the occasion of printing of the image data memorized by the digital camera, the image data memorized by this digital camera is read into an application program, is changed into print job data from this application program through a printer driver, and host equipment once outputs it to a printer.

[Problem(s) to be Solved by the Invention] The program size of a printer driver is usually hundreds of or more KBytes. Therefore, it excels in the engine performance of a processor and is satisfactory in any way about incorporating a printer driver with host equipments, such as abundant computers of memory space. However, it is difficult by the constraint on hardware etc. to incorporate a printer driver by small electronic equipment like a digital camera for example.

[0003] Then, this invention aims at enabling it to make a printer print the document data on host equipment, without host equipment needing a printer driver like before.

[0004] Moreover, this invention aims at offering the new communications protocol between the host equipment and the printers based on a specific command system.

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention is specified as follows.

[0005] This invention the printing setting-out information sent from host equipment Namely, reception, The data for printing specified for said printing setting-out information are required of said host equipment. The data for printing sent from said host equipment according to said demand Reception, It is the printer which prints based on said printing setting-out information and said data for printing, and when printing interruption information is received from host equipment while printing based on said data for printing, it is the printer characterized by interrupting said printing.

[0006] Moreover, the 1st reception means which receives the printing setting-out information that this invention is sent from host equipment, A demand means to require the data for printing specified for said printing setting-out information of said host equipment, The 2nd reception means which receives the data for printing sent from said host equipment according to said

demand, A generation means to generate the bit map data based on said data for printing based on said printing setting-out information, It is the printer equipped with a printing means to perform printing to a printing record medium based on said bit map data. When printing interruption information is received from host equipment while printing based on said data for printing, it is the printer characterized by interrupting said printing.

[0007] Here, said printer is characterized by sending the information about said printing processing termination to said host equipment, when said printing is interrupted. This invention the printing setting-out information sent from host equipment Furthermore, reception, The data for printing specified for said printing setting-out information are required of said host equipment. The data for printing sent from said host equipment according to said demand Reception, It is the printing control approach of the printer which prints based on said printing setting-out information and said data for printing. When printing interruption information is received from host equipment while printing based on said data for printing, it is the printing control approach characterized by interrupting said printing.

[0008] In addition, this invention is materialized also as a record medium which recorded the program product or the program. In addition, with said record medium, transmission media else [, such as a hard disk (HD), DVD-RAM a flexible disk (FD), and CD-ROM], such as memory, such as RAM and ROM, and a network, are included.

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained, referring to a drawing.

1 Configuration 1-1 Print structure-of-a-system drawing 1 is drawing showing the print structure of a system concerning this operation gestalt. As shown in this drawing, local connection of the printer 1 is made with host equipment 2 through the dedicated lines 3, such as a parallel cable, or network connection is carried out to host equipment 2 through the networks 4, such as LAN. Typically, although host equipment 2 can be transposed to electronic equipment, such as a digital camera and a scanner, it may be a general-purpose personal computer. Below, the print system by which the digital camera positioned at a printer 1 and host equipment 2 was connected to the network 4 is explained to an example.

1-2 The block diagram 2 of a printer is drawing showing the hardware configuration of a printer 1. A printer 1 is equipped with a processor 21, ROM22 and RAM23, a user interface 24, image memory 25, the engine controller 26, the print engine 27, and the communication link interface (henceforth "communication link I/F") 28 as shown in this drawing. A processor 21 has two incomes with other hardware, and makes a printer 1 realize a predetermined function by performing the program memorized by ROM22. For example, a processor 21 interprets the command sent from host equipment 2, and performs various kinds of processings according to the command so that it may mention later. Typically, a processor 21 changes into the bit map data of a raster format the data for printing sent from host equipment 2, and outputs them to image memory 25. RAM23 functions as main storage of a processor 21. A user interface 24 is constituted by a display panel, a manual operation button, etc. for performing for example, various printing setting out, and enables interactive actuation by the user. Image memory 25 memorizes bit map data required for printing in the predetermined number of bands. The engine controller 26 supplies the bit map data memorized by image memory 25 to the print engine 27. The print engine 27 is constituted by carriage, the print head, etc., and prints to printing record media, such as paper. The thing according to the class of printers, such as a laser beam printer and a serial printer, can be used for the print engine 27. Communication link I/F28 is for connecting with a network 4 physically and making network communication possible between host equipment 2.

1-3 The block diagram 3 of host equipment is drawing showing the hardware configuration of host equipment 2. As shown in this drawing, host equipment 2 is equipped with a processor 31, ROM32 and RAM33, a user interface 34, the input device 35, a file system 36, and communication link I/F37, and these are mutually connected through the internal bus. A processor 31 controls actuation of the host equipment 2 whole according to the program memorized by ROM32. RAM33 functions as main storage of a processor 31. If a user interface 34 is a digital camera, it will be constituted by a display panel, the manual operation button, etc.,

and will enable interactive actuation by the user. The input device 35 inputs into an internal bus the image data picturized and obtained by CCD according to the image pick-up directions by the user given from a user interface 34. A file system 36 is the so-called external storage constituted with a flash memory or a hard disk, and memorizes the image data incorporated by the input device 35 in a predetermined format. Communication link I/F37 is for connecting with a network 4 physically and making network communication possible between printers 1.

2 In the print system concerning the explanation book operation gestalt of a command, host equipment 2 and a printer 1 perform the communication link based on a predetermined command system, and advance printing processing. The command hereafter defined by the print system concerning this operation gestalt is explained.

2-1 The schematic diagram 4 of a command is drawing for explaining the outline of the command data used for the print system concerning this operation gestalt. As shown in this drawing, the command data in this operation gestalt consist of variable-length data streams. Hereafter, each field in drawing is explained.

[0009] ESC: The head marker of a sequence of bytes (a control code "ESC", 1Bh)
class: 1 byte of ASCII-code class showing the classification of a command is classified as follows.

[0010] d :datam : model dependento : objectp : pageparameter length: The die length of a parameter block (byte count)

command name: Identify a command in combination with 4 bytes of character string class showing a command name.

[0011] parameter block: It consists of parameter units of the number of parameter block arbitration.

[0012] parameter unit: It consists of 1 byte of parameter ID, delimiters ":", and values value which show the class of parameter unit parameter.

[0013] As for a command, the size of the value of each parameter is specified, respectively. Moreover, especially when using the numeric value of 2 bytes or more as a value of a parameter, unless the definition of each command shows, it considers as a big endian.

[0014] Moreover, when the parameter of the format of this drawing (b) is included in a parameter block, the binary data of a byte count shown by "data length" continue after a parameter block. The size of this binary data is not contained in "parameter length."

[0015] Subsequent explanation expresses a command in the format of "[class:command name]." For example, as for [p:make], class means that "p" and command name are "make."

2-2 Explanation of Each Command [(1) M:qlty] Set Printing Quality Printing Quality Setting Out (Drawing 5 and Drawing 6)

This command is sent from host equipment 2 to a printer 1. This command is for setting up printing conditions. A printer is specified and the contents of the parameter differ by the case where host equipment grasps the information on a model proper, and the case where it sets up without being dependent on a model.

[0016] M: Specify form quality. The range of a setting-out possible value and the class of corresponding form change with models.

[0017] Q: Specify printing quality in 16 steps.

[0018] P, T: Send in order the parameter which specifies the color correction of a photograph object and each text graph image object. each parameter — with a sign — it is 1 byte and considers as the range of -50+50. - When a value smaller than 50 is specified, treat as what - 50 was specified as. + When 50 is specified, treat as what +50 was specified as.

[0019] B: Specify color printing/black-and-white printing.

[0020] W: Specify ON/OFF of micro weave printing. The class of the range which can be specified as extended micro weave, and corresponding micro weave changes with models.

[0021] D: Specify the method of printing directional control.

[0022] H: Specify the class of half toning.

[0023] Z: Specify dot size. The range and the corresponding dot size of a setting-out possible value change with models.

[0024] H, T: Specify the print resolution of level and a perpendicular direction by dpi (dot per

inch). The range and default of a setting—out possible value change with models. Moreover, in both cases of one of horizontal and vertical assignment, it becomes a default.

[0025] L: Specify ID of custom LUT set up by [m:slut] as a reference table used for color conversion. The range which can be specified changes with models of printer. Moreover, when lut-id is not specified, according to the class and printing quality of a form, a printer 1 judges and LUT built in the printer 1 is used.

(2) [m:slut] set user defined LUT Custom LUT setting out (drawing 7)

This command is sent from host equipment 2 to a printer 1. This command is for setting the thing of custom as a printer as an LUT used for color conversion.

[0026] The ID number of LUT is specified. The class of storage place of LUT corresponding to the range of an ID number and ID number which can be set up changes with models. This command is disregarded when a not corresponding ID number is specified.

[0027] + The die length of LUT data is shown.

[0028] The binary data of the dtlen cutting tool following this command are treated as LUT data. A format of LUT data changes with models.

(3) [p:inqa] inquire page availability Page scope inquiry (drawing 8)

This command is sent from host equipment 2 to a printer 1. This command is for requiring the reply of the range which can set up a page printing field, and arrangement of a printer 1. A printer 1 is answered by the [p:rpla] command to this command.

[0029] D: Specify the denominator used by the reply to this inquiry. When not specified, the default value of a printer is used.

(4) [p:rpla] reply page availability Page scope reply (drawing 9)

This command is sent from a printer 1 to host equipment 2. This command is for answering the range which can set up a page printing field to the inquiry by the [p:inqa] command.

[0030] D: Express the denominator of each following parameter with the value specified by the [p:inqa] command. However, when 0 is specified by the [p:inqa] command, or when denomi is not specified by the [p:inqa] command, and when [when the value specified by the [p:inqa] command is used and the value of a molecule is not settled in 4 bytes, or], it answers using the default of a printer.

[0031] W, H: The maximum width and maximum length of a page printing field who can set up are shown.

[0032] Maximum width = width/denomi (inch)

Maximum length = height/denomi (inch)

In addition, when the maximum width and maximum length do not become an integer, it omits and answers.

[0033] T: The minimum value which can set up the distance (Top Margin) from a form upper bed to the upper bed of a page printing field is shown.

[0034]

Top Margin minimum value = tmrgin/denomi (inch)

In addition, when the Top Margin minimum value does not become an integer, it omits and answers.

[0035] L: The distance (left margin) from a form left end to the horizontal starting position of a page printing field is shown.

[0036]

Left margin = lmrgrin/denomi (inch)

In addition, when a left margin does not become an integer, it omits and answers.

[0037] R: The minimum distance (right margin minimum value) required even for the right end of a page printing field from a form right end is shown. It depends on a model for the processing at the time of setting up a page printing field in which the distance from a form right end to a page printing field right end is less than the right margin minimum value.

[0038]

Right margin minimum value = rmrgin/denomi (inch)

In addition, when the right margin minimum value does not become an integer, it omits and answers.

[0039] B: The minimum distance (bottom margin minimum value) required even for the soffit of a page printing field from a form soffit is shown. It depends on a model for the processing at the time of setting up a page printing field in which the distance from a form soffit to a page printing field soffit is less than the bottom margin minimum value.

[0040]

Bottom margin minimum value = $\text{bmargin}/\text{denomi}$ (inch)

In addition, when the bottom margin minimum value does not become an integer, it omits and answers.

(5) [p:make] make page Page format definition (drawing 10)

This command is sent from host equipment 2 to a printer 1. This command is for specifying the configuration method of a printing object while setting up the size of a page printing field. Host equipment 2 divides a page printing field in the shape of a grid, specifies one of "the individual assignment" which specifies a location as the "automatic layout" which arranges the printing object in each cel for every printing object, and specifies how many in the case of a "automatic layout", a page printing field is divided into level and a perpendicular direction, respectively.

[0041] D: Express the denominator of each following parameter.

[0042] W, H: Specify the width of face and die length of a page printing field.

[0043]

Width of face = $\text{width}/\text{denomi}$ (inch)

Die length = $\text{height}/\text{denomi}$ (inch)

When the width of face and/or die length exceeding maximum are specified, it treats as that to which the maximum width and/or maximum length were set. When the case where denomi is not specified, and 0 are specified, width and height are treated as the number of dots in the resolution specified by the [m:qlty] command.

[0044] T: Specify the distance (Top Margin) from a form upper bed to the upper bed of a page printing field.

[0045]

Top Margin = $\text{tmargin}/\text{denomi}$ (inch)

When Top Margin which is less than the minimum value is specified, a printer 1 is treated as that to which the minimum value was set. Moreover, when the case where denomi is not specified, and 0 are specified, tmargin is treated as the number of dots in the resolution specified by the [m:qlty] command.

[0046] A: Specify the configuration method of a printing object. In addition, in "perpendicular direction serial arrangement", the image data transfer by one way communication is performed.

[0047] H, V: Specify the number of partitions of horizontal and a perpendicular direction. It does not become a "automatic layout" when the case where these are not specified, and 0 are specified. These parameters are disregarded when the configuration method of a printing object is except a "automatic layout."

[0048] X, Y: Specify the rate of the part taken as a margin between each divided field at a percentage. When the case where it is not specified, and the value of 100 abnormalities are specified, it treats as what 0 was specified as. These parameters are disregarded when the configuration method of a printing object is except a "automatic layout."

(6) [p:proc] proceed A printing progress book command is sent from host equipment 2 to a printer 1. This command is for directing to perform printing of the image object set up by then.

(7) [p:fini] page finished Page processing termination (drawing 1111)

This command is sent from a printer 1 to host equipment 2. This command is for notifying that expansion processing was completed about the printed information set up by the [p:endp] command.

(8) [o:req3] request object numbers Object number demand (drawing 12)

This command is sent from host equipment 2 to a printer 1. This command is for requiring issuance of the "object number" used for setting out of a printing object of a printer. A printer 1 publishes an object number with 1 or multiple times, and a [o:iss#] command until it reaches the number demanded by this command.

(9) [p:endp] end of page Page setup termination (drawing 13 R> 3)

This command is sent from host equipment 2 to a printer 1. This command is for notifying that printed information setting out for 1 page was completed. When a number of object numbers demanded by the [o:req#] command when this command was received are not published by the [o:iss#] command yet, the issuance about the remaining parts does not have a line crack. Moreover, in spite of having published the object number from the printer by the [o:iss#] command, when there is an object number which is not used by the [o:make] command yet, the object number serves as an invalid.

(10) [p:term] terminate page Page processing interruption (drawing 14)

This command is sent from host equipment 2 to a printer 1. This command is for interrupting processing of the page under printing. A printer 1 performs interruption processing about all the printing objects under processing, and notifies processing termination to host equipment 2 by the [o:rles] command about each printing object. After interrupting processing of all printing objects, it notifies that interruption of page processing was completed by the [p:fini] command to host equipment 2. When a number of object numbers demanded by the [o:req#] command are not published by the [o:iss#] command yet, the demand about the remaining parts considered as cancellation, and acts as thing everybody. Moreover, in spite of having published the object number from the printer 1 by the [o:iss#] command, when there is an object number which is not used by the [m:make] command yet, the object number serves as an invalid.

(11) [o:iss#] issue object numbers Object number issuance (drawing 15)

This command is sent from a printer 1 to host equipment 2. This command is for publishing an usable object number to the demand by the [o:req#] command.

[0049] N: The number of the object numbers published by this command is shown.

[0050] # : an object number with usable host equipment 2 is shown for setting out of a printing object. When publishing two or more object numbers simultaneously, the object number for which the number shown by (nobj#) is different from each other continues.

(12) [o:mkim] make image object Image object setting out (drawing 16 , drawing 17 , drawing 18 , and drawing 19)

This command is sent from host equipment 2 to a printer 1. This command is for setting up an image printing object. When assignment of a page format is not performed by the [p:make] command, this command serves as an invalid.

[0051] # Choose and specify one of the object numbers published by :[o:iss#] command.

Henceforth, exchange of the information between the host equipments 2, such as information and image data, and printers 1 about the corresponding printing object is performed using this object number. In being as follows, this command serves as an invalid.

[0052] (i) The object number is not specified.

[0053] (ii) Object numbers other than the object number published by the [o:iss#] command were specified.

[0054] (iii) The object number already set up by the [o:mkim] command was specified.

[0055] D: Express the denominator of the following parameters.

[0056] X, Y: Specify the location at the upper left of an object expansion field by making the upper left of a page printing field into a zero.

[0057]

Horizontal position = (xpos)/(denomi) (inch) Vertical position = (ypos)/(denomi) (inch) denomi is not specified, or when 0 is specified, xpos and ypos are treated as the number of dots in the resolution specified by the [m:qlty] command. Moreover, when locations other than a page printing field are specified, an error is notified by the [o:rles] command, without performing printing of an object. In this case, this object number cannot be used until it is again published by the [o:iss#] command.

[0058] In addition, these parameters are disregarded when an automatic layout is specified by the [p:make] command.

[0059] W, H: It is for setting up the width of face and die length of an object expansion field.

[0060]

Width of face = (width)/(denomi) (inch) Die length = (height)/(denomi) (inch) denomi is not specified, or when 0 is specified, width and height are treated as the number of dots in the

resolution specified by the [m:qlty] command. Moreover, when width of face and die length which are protruded from a page printing field are specified, an error is notified by the [o:rles] command, without performing printing of an object. In this case, this object number cannot be used until it is again published by the [o:iss#] command.

[0061] In addition, these parameters are disregarded when an automatic layout is specified by the [p:make] command.

[0062] R: Specify the hand of cut of an image. In addition, when "4" or "5" is specified, a printer 1 will be determined according to own capacity.

[0063] F: Specify the size adjustment approach in case the aspect ratios of an object expansion field and image data differ.

[0064] In the case of "0", it prints so that image data may appear in ***** space. Right and left or the upper and lower sides of an object expansion field will remain. The aspect ratio of an image is saved.

[0065] In the case of "1", it prints so that all object expansion fields may be filled. Right and left or the upper and lower sides of image data will go out. The aspect ratio of an image is saved.

[0066] In the case of "2", the aspect ratio of an image is changed and printed so that image data may be exactly settled in an object expansion field.

[0067] A: When "0" or "1" is specified by size fitting, specify the upper and lower sides and arrangement of a longitudinal direction.

[0068] Q: Since expansion processing of an image is performed at a high speed, if possible, it will direct to thin out image data and to develop. Since data with low resolution will be used, printing quality deteriorates. Moreover, the high-speed resizing algorithm is used for resizing not using the algorithm specified by TBD.

[0069] I: In order to perform suitable color transform processing, specify the classification of an image. However, when image data is the format including in tentorium information, the assignment by intent is disregarded.

[0070] Z: Specify the size of an image data by the byte count. When it has memory area where a printer 1 is sufficient, expansion processing may be performed at a high speed by buffering an image data (when rotating especially an image). When dsize is not specified, even if it is the case where it has sufficient memory area, buffering of an image data is not performed.

[0071] P: Specify setting out of APF (Auto Photo Fine). APF is processing for adjusting image quality. An APF application item is specified with the existence of APF application, and a lower byte by the high-order byte. When a high-order byte is "1", the PURISU can of the image data is carried out before printing Uno, and the item specified with the lower byte is amended. When a high-order byte is "2", simple APF is applied based on the image statistic sent with Parameter S (statistical data). Simple APF performs contrast stretching, saturation emphasis, and sharpness. In this case, the PURISU can of image data is not performed. Moreover, when there is no parameter of statistical data, simple APF does not apply. In addition, a lower byte is disregarded when a high-order byte is "0" or "1."

[0072] S: It is for sending the statistical data of the image data for applying simple APF in order. A statistical data consists of maximum (YMAX, RMAX, GMAX, BMAX), the minimum value (Ymin, Rmin, Gmin, Bmin), a standard deviation value (YSTD, RSTD, GSTD, BSTD), and the average (YAVR, RAVR, GAVR, BAVR). Here, Y is brightness expressed with 1 byte, and is shown by the degree type.

[0073]

$Y = (38 \times R + 76 \times G + 14 \times B) / 128$ — RGB is expressed with each color of 8 bits again.

[0074] T: Specify drawing of a cutoff guide line. When it is specified as drawing and coincidence of a closing line, drawing assignment of a closing line serves as an invalid. Each value specifies the value which made denomi the denominator. For example, horizontal offset = OH/denomi (inch) When denomi is not specified, or when 0 is specified, a value is treated as the number of dots in the resolution specified by the [m:qlty] command.

[0075] B: Specify drawing of a closing line. However, when drawing of a cutoff guide line is specified, drawing assignment of a closing line is invalid. Each value specifies the value which made denomi the denominator. For example, horizontal offset = OH/denomi (inch) When denomi is

not specified, or when 0 is specified, a value is treated as the number of dots in the resolution specified by the [m:qlty] command.

[0076] ">" and "" specify the location, the size, and the color of a caption of an image. A caption is not printed when not specified.

[0077] offset: Specify the distance from the edge of an object expansion field.

[0078] Distance = offset/denomi (inch) When denomini is not specified, or when 0 is specified, a value is treated as the number of dots in the resolution specified by the [m:qlty] command.

[0079] pos: Specify a location and the sense of an alphabetic character.

[0080] P : the location to an image (0: top, the bottom of 1:, 2:right, 3: left)

A : arrangement (0: a left-justify, the center of 1:, 2:right justification)

I : sense of an alphabetic character (0: a normal position, 1:inversion)

pitch : a character pitch is specified.

[0081] size: Specify the size of an alphabetic character.

[0082] R, G, B : The color of a text is specified in RGB each color of 8 bits.

[0083] < (: the character string of a caption is specified by the ASCII code.) An unnecessary part is filled up with a null character when using a character string shorter than this by the 48-byte fixed length.

(13) [o:rls] release object Object release (drawing 20)

This command is sent from a printer 1 to host equipment 2. This command is for notifying that processing of a printing object was completed.

[0084] # : the object number of the printing object which processing ended is shown.

[0085] S: It is to show the condition of processing termination.

(14) [o:dreq] data request Data demand (drawing 21 R> 1)

This command is sent from a printer 1 to host equipment 2. This command is for requiring the image data of an object of host equipment 2.

[0086] # : specify the object of the printing object which requires data.

[0087] L: Specify the data length to demand.

[0088] Host equipment 2 is transmitted by the [d:dsnd] command according to the byte count of which the data of the corresponding printing object were required, when this command is received. Moreover, host equipment 2 notifies an error by the [d:dsnd] command, when it cannot transmit.

(15) [d:dsnd] send data Data transmission (drawing 22)

This command is sent from host equipment 2 to a printer 1. This command transmits the image data demanded by the [d:dreq] command to a printer 1.

[0089] # : specify the object number of the printing object which transmits data.

[0090] S: The transmit information of image data is shown.

[0091] + : the data length to transmit is shown. When data cannot be transmitted by the case where status is "1" or "2", dtlen is set to 0.

[0092] In addition, the binary data of the dtlen cutting tool following this command are treated as image data.

(16) [d:seek] seek Data read-out repositioning (drawing 23/24)

This command is sent from a printer 1 to host equipment 2. This command is for requiring modification of the data read-out location of a printing object of host equipment.

[0093] # : specify the object number of the printing object which changes a read-out location.

[0094] O: The criteria of read-out tab control specification are shown.

[0095] L: A byte count with a sign shows the distance from origin to a data read-out location.

[0096] After host equipment 2 received the [d:dreq] command before it transmits the demanded data to a printer 1 by the [d:dsnd] command, when this command is received, after it transmits the demanded data, it is read, and changes a location.

3 Explain a functional configuration, next the functional configuration of the print system concerning this operation gestalt.

3-1 The functional block diagram 24 of a printer is a block flow diagram which shows the functional configuration of a printer 1. That is, this drawing expresses functionally the printer 1 shown in drawing 2 . A printer 1 is equipped with the communication link I/F section 241, the

command interpretation section 242, the printing setting-out processing section 243, the proper information storage section 244, the setting-out information storage section 245, the printing processing section 246, and the print engine section 246 as shown in this drawing.

[0097] If command data are received from host equipment 2 through the communication link I/F section 241 (it is equivalent to communication link I/F28 of drawing 2 .), the command interpretation section 242 will interpret the command contained in this command data, and it will control it so that processing according to that interpretation result is performed. The printing setting-out processing section 243 advances processing about printing setting out by the communication link based on the defined command system between host equipment 2. About the detail of the printing setting-out processing section 43, it mentions later. The proper information storage section 244 memorizes the information (henceforth "proper information") about an own specification. Proper information is the value defined for every model of printers, such as resolution which can respond, a paper size which can be responded, and a page scope. The printing setting-out information storage section 245 memorizes the printing setting-out information which the printing setting-out processing section 244 set up based on the printing setting-out demand sent from host equipment 2. The printing processing section 246 develops the data for printing (printing object) sent from host equipment 2 through the command interpretation section 242 to the bit map data of a raster format based on the printing setting-out information memorized by the printing setting-out information storage section 45, and outputs this to the print engine section 246 (it is equivalent to the print engine 27 of drawing 2 .). About the detail of the printing processing section 246, it mentions later.

[0098] Drawing 25 is a block flow diagram which shows the functional configuration of the printing setting-out processing section 243. In this drawing, the printing quality setting-out section 251 processes the command data ([m:qlty] command) about printing quality setting out. Referring to the proper information memorized by the proper information storage section 244 according to the content of the parameter unit contained in command data, the printing quality setting-out section 251 creates the printing setting-out information about printing quality, and outputs this to the printing setting-out information storage section 245. That is, the content of the parameter unit specified by host equipment 2 is not absolute, it is changed so that the specification of a printer 1 may be suited, and it is outputted as printing setting-out information. For example, in the parameter "Q" which specifies image quality, like 1200dpi or 600dpi, an absolute value is not specified but it is specified with 16 steps of relative values. Therefore, if it is the printer which can respond to 1200dpi when "15" which means the highest image quality is specified, image quality will be set as 1200dpi, and if it is the printer which can respond to 600dpi, image quality will be set as 600dpi.

[0099] The page scope reply section 252 processes the command data ([p:inqa] command) about an inquiry of a page scope. The page scope reply section 252 will create the command data (command data ([p:rpla] command) about the reply of a page scope) for answering the range of the page printing field which can be set up with reference to the proper information memorized by the proper information storage section 244, if this command data is received. The created command data are sent to host equipment 2 through the communication link I/F section 241. In addition, the page scope reply section 252 is answered to the range of the page printing field which can be set up based on this multiplier, when the multiplier "D" is specified in the parameter unit of this command data.

[0100] The page format definition part 253 processes the command data ([p:make] command) about a page format definition. According to the content of the parameter unit contained in this command data, the page format definition part 253 creates the printing setting-out information about a page format of the size of a page printing field, the configuration method of a printing object, etc., and outputs this to the printing setting-out information storage section 245.

[0101] The object number issuance section 254 processes the command data ([o:req#] command) about the issuance demand of an object number. An object number is for managing a printing object according to an individual. The object number issuance section 254 creates command data (command data ([o:iss#] command) about issuance of an object number) for self to answer the manageable object number for several minutes simultaneously to the number of

the object numbers specified in the parameter unit (the number of objects to demand). The created command data are sent to host equipment 2 through the communication link I/F section 241.

[0102] The object setting-out section 255 processes the command data ([o:mkim] command) about setting out of a printing object. According to the content of the parameter unit contained in this command data, the object setting-out section 255 creates the printing setting-out information about setting out of a printing object, and outputs this to the printing setting-out information storage section 245.

[0103] The page setup termination section 256 processes the command data ([p:endp] command) about termination of page setup. The post process of page setup will be performed and the page setup termination section 256 will notify that to the object demand section 261 mentioned later, if this command data is received.

[0104] Drawing 26 is a block flow diagram which shows the functional configuration of the printing processing section 46. In this drawing, in order that the object demand section 261 may require the data of a printing object from host equipment 2, it creates the command data ([d:dreq] command) about a data demand, and outputs them to the communication link I/F section 241. The object demand section 261 specifies a printing object according to the printing setting-out information memorized by the printing setting-out information storage section 45, and requires the data for every printing object. In this case, the object demand section 261 specifies the data length (byte count) of the data to demand. That is, the object demand section 261 specifies the printing object arranged to a printing page field according to the created printing setting-out information in order of a raster, determines the data length demanded according to the operating condition of the buffer given to the printing object, and requires it of host equipment using the object number of the printing object.

[0105] The data-processing section 262 processes the command data ([d:dsnd] command) about data transmission. That is, the data-processing section 262 makes the data-processing module 263 process the data of the printing object contained in the command data about the data transmission which answers the command data about a data demand and is sent from host equipment 2 according to the printing setting-out information memorized by the printing setting-out information storage section 45, and outputs the bit map data of the raster format acquired eventually to image memory 264. The data-processing module 263 is equipped with the image expansion section 2631, the resolution converter 2632, the APF section 2633, and the color converter 2634 with this operation gestalt. In addition, as for the data-processing section 262, it is desirable to memorize the information about the what byte data it has a working area for several minutes of the published object number (buffer), and was acquired from host equipment 2, to what band eye it developed, or to the how many lines of bit map data it developed so that the data of a printing object can be processed, respectively.

[0106] The image expansion section 2631 develops the data of the printing object transmitted by compressed format (expanding), and restores them to the data of the original printing object. The resolution converter 2632 changes resolution according to the printing setting-out information memorized by the printing setting-out information storage section 245 in the data of the restored printing object. For example, when the expansion field of 2x3 (inch) is specified by the [o:mkim] command and the resolution of 720 (dpi) is indirectly specified by the [m:qlty] command, an image size will print the bit map data of 1440x2160 (dot). However, the image size of the printing object sent from host equipment 2 is not necessarily this size. For this reason, when smaller than the image size which the printing object sent from host equipment 2 should print, complement processing is performed, and infanticide processing is performed when larger than the image size which the printing object sent to reverse from host equipment 2 should print. These complement processing and infanticide processing shall be called resolution conversion here. In addition, with the "F" parameter of the [o:mkim] command, when specified that a printing object is exactly settled in an expansion field by changing an aspect ratio, a conversion rate (rate of a complement/infanticide) is changed in a lengthwise direction and a longitudinal direction, and resolution conversion is performed. The APF section 2633 amends an image according to the assignment, when the printing setting-out information about printing quality has

APF assignment. There are for example, tone adjustment, saturation emphasis, sharpness, etc. in amendment of an image. Moreover, the statistical data of an image may be used. The color converter 2634 changes the data expressed in RGB each color of 8 bits into the data expressed in CMYK each color of 8 bits. In this case, when the reference table (LUT) for color conversion is specified as printing setting-out information, refer to this for the color converter 2634.

[0107] When the data-processing module 263 is made to process the data-processing section 262 and expansion of a printing object is ended, it notifies the object number of the printing object to the object release section 255. The object release section 255 notifies having released the printing object to the object number issuance section 254 while, outputting the command data ([o:rles] command) about object release in response. If an object number is released, the object number issuance section 254 will publish a new object number, and will send it to host equipment 2. Thereby, host equipment 2 can set up a printing object now based on the newly published object number.

[0108] Image memory 264 memorizes the bit map data of a raster format processed by the data-processing module 263. The engine control section 266 supplies the image data memorized by image memory 264 to the print engine section 247.

3-2 The functional block diagram 27 of host equipment is a block flow diagram which shows the functional configuration of host equipment 2. That is, this drawing expresses functionally the host equipment 2 shown in drawing 3.

[0109] The printing control section 271 performs control about progress of printing according to the printing initiation directions and printing interruption directions which are given from the user interface section 272 (it is equivalent to the user interface 34 of drawing 3.). The printing control section 271 outputs the command data ([p:term] command) about page processing interruption to the communication link I/F section 273 to a printer 1, when interruption directions of printing are given.

[0110] The printing setting-out demand section 274 creates the command data ([m:qlty] command etc.) which include printing specification information in a parameter unit with reference to the printing specification information storage section 275, and outputs them to the communication link I/F section 73. Printing specification information includes printing quality, the information about a page format, etc. Printing specification information is set up beforehand or is inputted from the user interface section 272.

[0111] If command data are received from a printer 1 through the communication link I/F section 273, the command interpretation section 276 will interpret the command contained in this command data, and it will control it so that processing according to that interpretation result is performed. The file access section 277 is for accessing the data storage section 278, and writing in or reading data. If the command data ([d:dreq] command) about a data demand are received, the file access section 277 will read the data of the printing object specified in the parameter unit from the data storage section 278, will create the command data ([d:dsnd] command) about the data transmission which contains this in a parameter unit, and will output them to the communication link I/F section 273. The input device 279 makes the data storage section 278 memorize the acquired image data through the file access section 277 according to the input directions given from the user I/F section 272.

[0112] Drawing 28 is a block flow diagram which shows the functional configuration of the printing setting-out demand section 73. In this drawing, the printing quality setting-out demand section 81 creates the command data about printing quality setting out based on the printing specification information memorized by the printing specification information storage section 74, and outputs this to the communication link I/F section 75. The page scope demand section 82 outputs command data concerning an inquiry in a page scope to the communication link I/F section 75. This command data is answered and the command data ([p:rpla] command) about the reply of the page scope sent from a printer 1 are inputted into the page format demand section 83 through the command interpretation section 76. The page format demand section 83 creates the command data ([p:mak] command) about a page format of the size of a page printing field, a configuration method, etc. according to the page scope acquired from the printing specification information and the printer 1 which were memorized by the printing specification information

storage section 75. The object number demand section 84 outputs the command data ([o:req#] command) about the issuance demand of an object number in order to require a required object number of a printer 1 based on the printing specification information memorized by the printing specification information storage section 75. The command data ([o:iss#] command) about issuance of the object number which answers this command data and is sent from a printer 1 are inputted into the object setting-out demand section 85. The object setting-out demand section 85 creates the command data ([o:mkim] command) about setting out of a printing object based on the page format set up by the page format demand section 83. Setting out of a printing object is performed for every printing object identified by the object number. The advice section 86 of page setup termination creates the command data for notifying to a printer 1 that setting out of the printing specification for 1 page ([p:endp] command) was completed.

4 Explanation 4-1 of operation Printing setting-out processing drawing 29 is a timing chart for explaining printing setting-out processing of the print system concerning this operation gestalt.

- (1) If printing initiation directions are given from a user, host equipment 2 will send the command data about printing quality setting out to a printer 1. A printer 1 creates the printing setting-out information concerning printing quality in this command data according to reception and the proper information on own.
- (2) Host equipment 2 sends the command data about an inquiry of a page scope to a printer 1.
- (3) A printer 1 will send the command data about the reply of a page scope to host equipment 2, if this command data is received.
- (4) If a reply is received about a page scope, host equipment 2 will create a page format based on this page scope, and will send the command data about a page format to a printer 1. A printer 1 creates the printing setting-out information concerning reception and a page format in this command data.
- (5) It sends the command data about the issuance demand of an object number to a printer 1 in order to require issuance of an object number required for printing of a printing object, after host equipment 2 requires a page format of a printer 1.
- (6) A printer 1 sends the command data about issuance of an object number to host equipment 2 in order to notify the object number which can be treated simultaneously in person to host equipment 2, if the command data about the issuance demand of an object number are received.
- (7) Host equipment 2 sends the command data about object setting out to a printer 1 about each of a printing object according to the object number permitted by the printer 1.
- (8) Host equipment 2 sends the command data about page setup termination to a printer 1, after setting out for 1 page is completed by notifying setting out to a printer 1 about each of a printing object. A printer 1 starts following data transfer and printing processing by receiving this command data.

4-2 Data transfer and printing processing drawing 30 are the timing charts for explaining data transfer processing of the print system concerning this operation gestalt.

- (1) A printer 1 sends the command data about a data demand to host equipment 2 in order to require the data of a printing object, if the command data about page setup termination are received.
- (2) If the command data about a data demand are received, host equipment 2 will read the data of a printing object according to assignment of parameter data, and will send the command data about data transmission to a printer 1.
- (3) Host equipment 2 sends the command data about page processing interruption to a printer 1 according to directions, error generating, etc. of a user. A printer 1 interrupts the processing, when printing processing (expansion processing is included.) is being carried out.
- (4) A printer 1 outputs the command data about object release to host equipment 2 about all printing objects.
- (5) In order to notify that processing interrupted the printer 1 about all printing objects to host equipment 2, send the command data about page processing termination to host equipment 2.

[0113] The above-mentioned operation gestalt is the instantiation for explaining this invention, and is not the meaning which limits this invention only to these operation gestalten. This invention can be carried out with various gestalten, unless it deviates from the summary. For

example, although actuation of the above-mentioned functional implementation means was explained sequentially, it does not adhere to especially this. Therefore, unless conflict arises in actuation, you may constitute so that parallel operation of the sequence of processing may be replaced or carried out.

[Effect of the Invention] A printer can be made to print the document data on host equipment according to this invention, without host equipment needing a printer driver like before. Therefore, it can be made to print from cheap host equipment directly to a printer through a computer now.

[Translation done.]

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.....

TECHNICAL FIELD

.....

[Field of the Invention] This invention relates to the technique of a printer. Moreover, this invention relates to the technique of the processing control based on the specific command system used by the communication link between host equipment and a printer.

.....

[Translation done.]

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PRIOR ART

[Description of the Prior Art] In order for the host equipment represented by the personal computer to make a printer print an application data, host equipment needs the printer driver (program for printer control) prepared for every printer. If an application data is received from an application program, a printer driver will be changed into the print job data of a printer proper, and will be outputted to the printer. If these print job data are received, a printer will interpret this, will generate the bit map data of a raster format, and will realize the print to a print sheet. [0002] Moreover, in typical information processing system, electronic equipment, such as a printer, and a scanner, a digital camera, is arranged to the perimeter centering on host equipment. The host equipment with which the driver (device driver) of the proper for every electronic equipment was incorporated mediates information among these electronic equipment. For example, on the occasion of printing of the image data memorized by the digital camera, the image data memorized by this digital camera is read into an application program, is changed into print job data from this application program through a printer driver, and host equipment once outputs it to a printer.

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EFFECT OF THE INVENTION

[Effect of the Invention] A printer can be made to print the document data on host equipment according to this invention, without host equipment needing a printer driver like before. Therefore, it can be made to print from cheap host equipment directly to a printer through a computer now.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The program size of a printer driver is usually hundreds of or more KBytes. Therefore, it excels in the engine performance of a processor and is satisfactory in any way about incorporating a printer driver with host equipments, such as abundant computers of memory space. However, it is difficult by the constraint on hardware etc. to incorporate a printer driver by small electronic equipment like a digital camera for example. [0003] Then, this invention aims at enabling it to make a printer print the document data on host equipment, without host equipment needing a printer driver like before. [0004] Moreover, this invention aims at offering the new communications protocol between the host equipment and the printers based on a specific command system.

[Translation done.]

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention is specified as follows.

[0005] This invention the printing setting-out information sent from host equipment Namely, reception, The data for printing specified for said printing setting-out information are required of said host equipment. The data for printing sent from said host equipment according to said demand Reception, It is the printer which prints based on said printing setting-out information and said data for printing, and when printing interruption information is received from host equipment while printing based on said data for printing, it is the printer characterized by interrupting said printing.

[0006] Moreover, the 1st reception means which receives the printing setting-out information that this invention is sent from host equipment, A demand means to require the data for printing specified for said printing setting-out information of said host equipment, The 2nd reception means which receives the data for printing sent from said host equipment according to said demand, A generation means to generate the bit map data based on said data for printing based on said printing setting-out information, It is the printer equipped with a printing means to perform printing to a printing record medium based on said bit map data. When printing interruption information is received from host equipment while printing based on said data for printing, it is the printer characterized by interrupting said printing.

[0007] Here, said printer is characterized by sending the information about said printing processing termination to said host equipment, when said printing is interrupted. This invention the printing setting-out information sent from host equipment Furthermore, reception, The data for printing specified for said printing setting-out information are required of said host equipment. The data for printing sent from said host equipment according to said demand Reception, It is the printing control approach of the printer which prints based on said printing setting-out information and said data for printing. When printing interruption information is received from host equipment while printing based on said data for printing, it is the printing control approach characterized by interrupting said printing.

[0008] In addition, this invention is materialized also as a record medium which recorded the program product or the program. In addition, with said record medium, transmission media else [, such as a hard disk (HD), DVD-RAM a flexible disk (FD), and CD-ROM], such as memory, such as RAM and ROM, and a network, are included.

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained, referring to a drawing.

1 Configuration 1-1 Print structure-of-a-system drawing 1 is drawing showing the print structure of a system concerning this operation gestalt. As shown in this drawing, local connection of the printer 1 is made with host equipment 2 through the dedicated lines 3, such as a parallel cable, or network connection is carried out to host equipment 2 through the networks 4, such as LAN. Typically, although host equipment 2 can be transposed to electronic equipment, such as a digital camera and a scanner, it may be a general-purpose personal computer. Below, the print system by which the digital camera positioned at a printer 1 and host equipment 2 was connected to the network 4 is explained to an example.

1-2 The block diagram 2 of a printer is drawing showing the hardware configuration of a printer 1. A printer 1 is equipped with a processor 21, ROM22 and RAM23, a user interface 24, image memory 25, the engine controller 26, the print engine 27, and the communication link interface (henceforth "communication link I/F") 28 as shown in this drawing. A processor 21 has two incomes with other hardware, and makes a printer 1 realize a predetermined function by performing the program memorized by ROM22. For example, a processor 21 interprets the command sent from host equipment 2, and performs various kinds of processings according to the command so that it may mention later. Typically, a processor 21 changes into the bit map data of a raster format the data for printing sent from host equipment 2, and outputs them to image memory 25. RAM23 functions as main storage of a processor 21. A user interface 24 is constituted by a display panel, a manual operation button, etc. for performing for example, various printing setting out, and enables interactive actuation by the user. Image memory 25 memorizes bit map data required for printing in the predetermined number of bands. The engine controller 26 supplies the bit map data memorized by image memory 25 to the print engine 27. The print engine 27 is constituted by carriage, the print head, etc., and prints to printing record media, such as paper. The thing according to the class of printers, such as a laser beam printer and a serial printer, can be used for the print engine 27. Communication link I/F28 is for connecting with a network 4 physically and making network communication possible between host equipment 2.

1-3 The block diagram 3 of host equipment is drawing showing the hardware configuration of host equipment 2. As shown in this drawing, host equipment 2 is equipped with a processor 31, ROM32 and RAM33, a user interface 34, the input device 35, a file system 36, and communication link I/F37, and these are mutually connected through the internal bus. A processor 31 controls actuation of the host equipment 2 whole according to the program memorized by ROM32. RAM33 functions as main storage of a processor 31. If a user interface 34 is a digital camera, it will be constituted by a display panel, the manual operation button, etc., and will enable interactive actuation by the user. The input device 35 inputs into an internal bus the image data picturized and obtained by CCD according to the image pick-up directions by the user given from a user interface 34. A file system 36 is the so-called external storage constituted with a flash memory or a hard disk, and memorizes the image data incorporated by the input device 35 in a predetermined format. Communication link I/F37 is for connecting with a network 4 physically and making network communication possible between printers 1.

2 In the print system concerning the explanation book operation gestalt of a command, host equipment 2 and a printer 1 perform the communication link based on a predetermined command system, and advance printing processing. The command hereafter defined by the print system concerning this operation gestalt is explained.

2-1 The schematic diagram 4 of a command is drawing for explaining the outline of the command data used for the print system concerning this operation gestalt. As shown in this drawing, the command data in this operation gestalt consist of variable-length data streams. Hereafter, each field in drawing is explained.

[0009] ESC: The head marker of a sequence of bytes (a control code "ESC", 1Bh)
class: 1 byte of ASCII-code class showing the classification of a command is classified as follows.

[0010] d : datam : model dependento : objectp : pageparameter length: The die length of a parameter block (byte count)

command name: Identify a command in combination with 4 bytes of character string class showing a command name.

[0011] parameter block: It consists of parameter units of the number of parameter block arbitration.

[0012] parameter unit: It consists of 1 byte of parameter ID, delimiters ":", and values value which show the class of parameter unit parameter.

[0013] As for a command, the size of the value of each parameter is specified, respectively. Moreover, especially when using the numeric value of 2 bytes or more as a value of a parameter, unless the definition of each command shows, it considers as a big endian.

[0014] Moreover, when the parameter of the format of this drawing (b) is included in a parameter block, the binary data of a byte count shown by "data length" continue after a parameter block. The size of this binary data is not contained in "parameter length."

[0015] Subsequent explanation expresses a command in the format of "[class:command name]." For example, as for [p:make], class means that "p" and command name are "make."

2-2 Explanation of Each Command [(1) M:qlty] Set Printing Quality Printing Quality Setting Out (Drawing 5 and Drawing 6)

This command is sent from host equipment 2 to a printer 1. This command is for setting up printing conditions. A printer is specified and the contents of the parameter differ by the case where host equipment grasps the information on a model proper, and the case where it sets up without being dependent on a model.

[0016] M: Specify form quality. The range of a setting-out possible value and the class of corresponding form change with models.

[0017] Q: Specify printing quality in 16 steps.

[0018] P, T: Send in order the parameter which specifies the color correction of a photograph object and each text graph image object. each parameter -- with a sign -- it is 1 byte and considers as the range of -50--+50. - When a value smaller than 50 is specified, treat as what -50 was specified as. + When 50 is specified, treat as what +50 was specified as.

[0019] B: Specify color printing/black-and-white printing.

[0020] W: Specify ON/OFF of micro weave printing. The class of the range which can be specified as extended micro weave, and corresponding micro weave changes with models.

[0021] D: Specify the method of printing directional control.

[0022] H: Specify the class of half toning.

[0023] Z: Specify dot size. The range and the corresponding dot size of a setting-out possible value change with models.

[0024] H, T: Specify the print resolution of level and a perpendicular direction by dpi (dot per inch). The range and default of a setting-out possible value change with models. Moreover, in both cases of one of horizontal and vertical assignment, it becomes a default.

[0025] L: Specify ID of custom LUT set up by [m:slut] as a reference table used for color conversion. The range which can be specified changes with models of printer. Moreover, when lut-id is not specified, according to the class and printing quality of a form, a printer 1 judges and LUT built in the printer 1 is used.

(2) [m:slut] set user defined LUT Custom LUT setting out (drawing 7)

This command is sent from host equipment 2 to a printer 1. This command is for setting the thing of custom as a printer as an LUT used for color conversion.

[0026] The ID number of !:LUT is specified. The class of storage place of LUT corresponding to the range of an ID number and ID number which can be set up changes with models. This command is disregarded when a not corresponding ID number is specified.

[0027] + The die length of :LUT data is shown.

[0028] The binary data of the dtlen cutting tool following this command are treated as LUT data. A format of LUT data changes with models.

(3) [p:inqa] inquire page availability Page scope inquiry (drawing 8)

This command is sent from host equipment 2 to a printer 1. This command is for requiring the reply of the range which can set up a page printing field, and arrangement of a printer 1. A printer 1 is answered by the [p:rpla] command to this command.

[0029] D: Specify the denominator used by the reply to this inquiry. When not specified, the default value of a printer is used.

(4) [p:rpla] reply page availability Page scope reply (drawing 9)

This command is sent from a printer 1 to host equipment 2. This command is for answering the range which can set up a page printing field to the inquiry by the [p:inqa] command.

[0030] D: Express the denominator of each following parameter with the value specified by the [p:inqa] command. However, when 0 is specified by the [p:inqa] command, or when denomi is not specified by the [p:inqa] command, and when [when the value specified by the [p:inqa] command is used and the value of a molecule is not settled in 4 bytes, or], it answers using the default of

a printer.

[0031] W, H: The maximum width and maximum length of a page printing field who can set up are shown.

[0032] Maximum width = width/denomi (inch)

Maximum length = height/denomi (inch)

In addition, when the maximum width and maximum length do not become an integer, it omits and answers.

[0033] T: The minimum value which can set up the distance (Top Margin) from a form upper bed to the upper bed of a page printing field is shown.

[0034]

Top Margin minimum value = tmargin/denomi (inch)

In addition, when the Top Margin minimum value does not become an integer, it omits and answers.

[0035] L: The distance (left margin) from a form left end to the horizontal starting position of a page printing field is shown.

[0036]

Left margin = lmargin/denomi (inch)

In addition, when a left margin does not become an integer, it omits and answers.

[0037] R: The minimum distance (right margin minimum value) required even for the right end of a page printing field from a form right end is shown. It depends on a model for the processing at the time of setting up a page printing field in which the distance from a form right end to a page printing field right end is less than the right margin minimum value.

[0038]

Right margin minimum value = rmargin/denomi (inch)

In addition, when the right margin minimum value does not become an integer, it omits and answers.

[0039] B: The minimum distance (bottom margin minimum value) required even for the soffit of a page printing field from a form soffit is shown. It depends on a model for the processing at the time of setting up a page printing field in which the distance from a form soffit to a page printing field soffit is less than the bottom margin minimum value.

[0040]

Bottom margin minimum value = bmargin/denomi (inch)

In addition, when the bottom margin minimum value does not become an integer, it omits and answers.

(5) [p:make] make page. Page format definition (drawing 10)

This command is sent from host equipment 2 to a printer 1. This command is for specifying the configuration method of a printing object while setting up the size of a page printing field. Host equipment 2 divides a page printing field in the shape of a grid, specifies one of "the individual assignment" which specifies a location as the "automatic layout" which arranges the printing object in each cel for every printing object, and specifies how many in the case of a "automatic layout", a page printing field is divided into level and a perpendicular direction, respectively.

[0041] D: Express the denominator of each following parameter.

[0042] W, H: Specify the width of face and die length of a page printing field.

[0043]

Width of face = width/denomi (inch)

Die length = height/denomi (inch)

When the width of face and/or die length exceeding maximum are specified, it treats as that to which the maximum width and/or maximum length were set. When the case where denomi is not specified, and 0 are specified, width and height are treated as the number of dots in the resolution specified by the [m:qlty] command.

[0044] T: Specify the distance (Top Margin) from a form upper bed to the upper bed of a page printing field.

[0045]

Top Margin = tmargin/denomi (inch)

When Top Margin which is less than the minimum value is specified, a printer 1 is treated as that to which the minimum value was set. Moreover, when the case where denomi is not specified, and 0 are specified, tmrgin is treated as the number of dots in the resolution specified by the [m:qlty] command.

[0046] A: Specify the configuration method of a printing object. In addition, in "perpendicular direction serial arrangement", the image data transfer by one way communication is performed.

[0047] H, V: Specify the number of partitions of horizontal and a perpendicular direction. It does not become a "automatic layout" when the case where these are not specified, and 0 are specified. These parameters are disregarded when the configuration method of a printing object is except a "automatic layout."

[0048] X, Y: Specify the rate of the part taken as a margin between each divided field at a percentage. When the case where it is not specified, and the value of 100 abnormalities are specified, it treats as what 0 was specified as. These parameters are disregarded when the configuration method of a printing object is except a "automatic layout."

(6) [p:proc] proceed A printing progress book command is sent from host equipment 2 to a printer 1. This command is for directing to perform printing of the image object set up by then.

(7) [p:fini] page finished Page processing termination (drawing 1111)

This command is sent from a printer 1 to host equipment 2. This command is for notifying that expansion processing was completed about the printed information set up by the [p:endp] command.

(8) [o:req3] request object numbers Object number demand (drawing 12)

This command is sent from host equipment 2 to a printer 1. This command is for requiring issuance of the "object number" used for setting out of a printing object of a printer. A printer 1 publishes an object number with 1 or multiple times, and a [o:iss#] command until it reaches the number demanded by this command.

(9) [p:endp] end of page Page setup termination (drawing 13 R> 3)

This command is sent from host equipment 2 to a printer 1. This command is for notifying that printed information setting out for 1 page was completed. When a number of object numbers demanded by the [o:req#] command when this command was received are not published by the [o:iss#] command yet, the issuance about the remaining parts does not have a line crack. Moreover, in spite of having published the object number from the printer by the [o:iss#] command, when there is an object number which is not used by the [o:make] command yet, the object number serves as an invalid.

(10) [p:term] terminate page Page processing interruption (drawing 14)

This command is sent from host equipment 2 to a printer 1. This command is for interrupting processing of the page under printing. A printer 1 performs interruption processing about all the printing objects under processing, and notifies processing termination to host equipment 2 by the [o:rls] command about each printing object. After interrupting processing of all printing objects, it notifies that interruption of page processing was completed by the [p:fini] command to host equipment 2. When a number of object numbers demanded by the [o:req#] command are not published by the [o:iss#] command yet, the demand about the remaining parts considered as cancellation, and acts as thing everybody. Moreover, in spite of having published the object number from the printer 1 by the [o:iss#] command, when there is an object number which is not used by the [m:make] command yet, the object number serves as an invalid.

(11) [o:iss#] issue object numbers Object number issuance (drawing 15)

This command is sent from a printer 1 to host equipment 2. This command is for publishing an usable object number to the demand by the [o:req#] command.

[0049] N: The number of the object numbers published by this command is shown.

[0050] #: an object number with usable host equipment 2 is shown for setting out of a printing object. When publishing two or more object numbers simultaneously, the object number for which the number shown by (nobj#) is different from each other continues.

(12) [o:mkim] make image object Image object setting out (drawing 16 , drawing 17 , drawing 18 , and drawing 19)

This command is sent from host equipment 2 to a printer 1. This command is for setting up an

image printing object. When assignment of a page format is not performed by the [p:make] command, this command serves as an invalid.

[0051] # Choose and specify one of the object numbers published by :[o:iss#] command.

Henceforth, exchange of the information between the host equipments 2, such as information and image data, and printers 1 about the corresponding printing object is performed using this object number. In being as follows, this command serves as an invalid.

[0052] (i) The object number is not specified.

[0053] (ii) Object numbers other than the object number published by the [o:iss#] command were specified.

[0054] (iii) The object number already set up by the [o:mkim] command was specified.

[0055] D: Express the denominator of the following parameters.

[0056] X, Y: Specify the location at the upper left of an object expansion field by making the upper left of a page printing field into a zero.

[0057]

Horizontal position = (xpos)/(denomi) (inch) Vertical position = (ypos)/(denomi) (inch) denomi is not specified, or when 0 is specified, xpos and ypos are treated as the number of dots in the resolution specified by the [m:qlty] command. Moreover, when locations other than a page printing field are specified, an error is notified by the [o:rles] command, without performing printing of an object. In this case, this object number cannot be used until it is again published by the [o:iss#] command.

[0058] In addition, these parameters are disregarded when an automatic layout is specified by the [p:make] command.

[0059] W, H: It is for setting up the width of face and die length of an object expansion field.

[0060]

Width of face = (width)/(denomi) (inch) Die length = (height)/(denomi) (inch) denomi is not specified, or when 0 is specified, width and height are treated as the number of dots in the resolution specified by the [m:qlty] command. Moreover, when width of face and die length which are protruded from a page printing field are specified, an error is notified by the [o:rles] command, without performing printing of an object. In this case, this object number cannot be used until it is again published by the [o:iss#] command.

[0061] In addition, these parameters are disregarded when an automatic layout is specified by the [p:make] command.

[0062] R: Specify the hand of cut of an image. In addition, when "4" or "5" is specified, a printer 1 will be determined according to own capacity.

[0063] F: Specify the size adjustment approach in case the aspect ratios of an object expansion field and image data differ.

[0064] In the case of "0", it prints so that image data may appear in ***** space. Right and left or the upper and lower sides of an object expansion field will remain. The aspect ratio of an image is saved.

[0065] In the case of "1", it prints so that all object expansion fields may be filled. Right and left or the upper and lower sides of image data will go out. The aspect ratio of an image is saved.

[0066] In the case of "2", the aspect ratio of an image is changed and printed so that image data may be exactly settled in an object expansion field.

[0067] A: When "0" or "1" is specified by size fitting, specify the upper and lower sides and arrangement of a longitudinal direction.

[0068] Q: Since expansion processing of an image is performed at a high speed, if possible, it will direct to thin out image data and to develop. Since data with low resolution will be used, printing quality deteriorates. Moreover, the high-speed resizing algorithm is used for resizing not using the algorithm specified by TBD.

[0069] I: In order to perform suitable color transform processing, specify the classification of an image. However, when image data is the format including in tentorium information, the assignment by intent is disregarded.

[0070] Z: Specify the size of an image data by the byte count. When it has memory area where a printer 1 is sufficient, expansion processing may be performed at a high speed by buffering an

image data (when rotating especially an image). When dtsize is not specified, even if it is the case where it has sufficient memory area, buffering of an image data is not performed.

[0071] P: Specify setting out of APF (Auto Photo Fine). APF is processing for adjusting image quality. An APF application item is specified with the existence of APF application, and a lower byte by the high-order byte. When a high-order byte is "1", the PURISU can of the image data is carried out before printing Uno, and the item specified with the lower byte is amended. When a high-order byte is "2", simple APF is applied based on the image statistic sent with Parameter S (statistical data). Simple APF performs contrast stretching, saturation emphasis, and sharpness. In this case, the PURISU can of image data is not performed. Moreover, when there is no parameter of statistical data, simple APF does not apply. In addition, a lower byte is disregarded when a high-order byte is "0" or "1."

[0072] S: It is for sending the statistical data of the image data for applying simple APF in order. A statistical data consists of maximum (YMAX, RMAX, GMAX, BMAX), the minimum value (Ymin, Rmin, Gmin, Bmin), a standard deviation value (YSTD, RSTD, GSTD, BSTD), and the average (YAVR, RAVR, GAVR, BAVR). Here, Y is brightness expressed with 1 byte, and is shown by the degree type.

[0073]

$Y = (38 \times R + 76 \times G + 14 \times B) / 128$ — RGB is expressed with each color of 8 bits again.

[0074] T: Specify drawing of a cutoff guide line. When it is specified as drawing and coincidence of a closing line, drawing assignment of a closing line serves as an invalid. Each value specifies the value which made denomi the denominator. For example, horizontal offset = OH/denomi (inch) When denomi is not specified, or when 0 is specified, a value is treated as the number of dots in the resolution specified by the [m:qlty] command.

[0075] B: Specify drawing of a closing line. However, when drawing of a cutoff guide line is specified, drawing assignment of a closing line is invalid. Each value specifies the value which made denomi the denominator. For example, horizontal offset = OH/denomi (inch) When denomi is not specified, or when 0 is specified, a value is treated as the number of dots in the resolution specified by the [m:qlty] command.

[0076] ">" and "" specify the location, the size, and the color of a caption of an image. A caption is not printed when not specified.

[0077] offset: Specify the distance from the edge of an object expansion field.

[0078] Distance = offset/denomi (inch) When denomi is not specified, or when 0 is specified, a value is treated as the number of dots in the resolution specified by the [m:qlty] command.

[0079] pos: Specify a location and the sense of an alphabetic character.

[0080] P : the location to an image (0: top, the bottom of 1:, 2:right, 3: left)

A : arrangement (0: a left-justify, the center of 1:, 2:right justification)

I : sense of an alphabetic character (0: a normal position, 1:inversion)

pitch : a character pitch is specified.

[0081] size: Specify the size of an alphabetic character.

[0082] R, G, B : The color of a text is specified in RGB each color of 8 bits.

[0083] < (: the character string of a caption is specified by the ASCII code.) An unnecessary part is fill uped with a null character when using a character string shorter than this by the 48-byte fixed length.

(13) [o:rls] release object Object release (drawing 20)

This command is sent from a printer 1 to host equipment 2. This command is for notifying that processing of a printing object was completed.

[0084] # : the object number of the printing object which processing ended is shown.

[0085] S: It is to show the condition of processing termination.

(14) [o:dreq] data request Data demand (drawing 21 R> 1)

This command is sent from a printer 1 to host equipment 2. This command is for requiring the image data of an object of host equipment 2.

[0086] # : specify the object of the printing object which requires data.

[0087] L: Specify the data length to demand.

[0088] Host equipment 2 is transmitted by the [d:dsnd] command according to the byte count of

which the data of the corresponding printing object were required, when this command is received. Moreover, host equipment 2 notifies an error by the [d:dsnd] command, when it cannot transmit.

(15) [d:dsnd] send data Data transmission (drawing 22)

This command is sent from host equipment 2 to a printer 1. This command transmits the image data demanded by the [d:dreq] command to a printer 1.

[0089] # : specify the object number of the printing object which transmits data.

[0090] S: The transmit information of image data is shown.

[0091] + : the data length to transmit is shown. When data cannot be transmitted by the case where status is "1" or "2", dtlen is set to 0.

[0092] In addition, the binary data of the dtlen cutting tool following this command are treated as image data.

(16) [d:seek] seek Data read-out repositioning (drawing 2323)

This command is sent from a printer 1 to host equipment 2. This command is for requiring modification of the data read-out location of a printing object of host equipment.

[0093] # : specify the object number of the printing object which changes a read-out location.

[0094] O: The criteria of read-out tab control specification are shown.

[0095] L: A byte count with a sign shows the distance from origin to a data read-out location.

[0096] After host equipment 2 received the [d:dreq] command before it transmits the demanded data to a printer 1 by the [d:dsnd] command, when this command is received, after it transmits the demanded data, it is read, and changes a location.

3 Explain a functional configuration, next the functional configuration of the print system concerning this operation gestalt.

3-1 The functional block diagram 24 of a printer is a block flow diagram which shows the functional configuration of a printer 1. That is, this drawing expresses functionally the printer 1 shown in drawing 2 . A printer 1 is equipped with the communication link I/F section 241, the command interpretation section 242, the printing setting-out processing section 243, the proper information storage section 244, the setting-out information storage section 245, the printing processing section 246, and the print engine section 246 as shown in this drawing.

[0097] If command data are received from host equipment 2 through the communication link I/F section 241 (it is equivalent to communication link I/F28 of drawing 2 .), the command interpretation section 242 will interpret the command contained in this command data, and it will control it so that processing according to that interpretation result is performed. The printing setting-out processing section 243 advances processing about printing setting out by the communication link based on the defined command system between host equipment 2. About the detail of the printing setting-out processing section 43, it mentions later. The proper information storage section 244 memorizes the information (henceforth "proper information") about an own specification. Proper information is the value defined for every model of printers, such as resolution which can respond, a paper size which can be responded, and a page scope. The printing setting-out information storage section 245 memorizes the printing setting-out information which the printing setting-out processing section 244 set up based on the printing setting-out demand sent from host equipment 2. The printing processing section 246 develops the data for printing (printing object) sent from host equipment 2 through the command interpretation section 242 to the bit map data of a raster format based on the printing setting-out information memorized by the printing setting-out information storage section 45, and outputs this to the print engine section 246 (it is equivalent to the print engine 27 of drawing 2 .). About the detail of the printing processing section 246, it mentions later.

[0098] Drawing 25 is a block flow diagram which shows the functional configuration of the printing setting-out processing section 243. In this drawing, the printing quality setting-out section 251 processes the command data ([m:qlty] command) about printing quality setting out. Referring to the proper information memorized by the proper information storage section 244 according to the content of the parameter unit contained in command data, the printing quality setting-out section 251 creates the printing setting-out information about printing quality, and outputs this to the printing setting-out information storage section 245. That is, the content of

the parameter unit specified by host equipment 2 is not absolute, it is changed so that the specification of a printer 1 may be suited, and it is outputted as printing setting-out information. For example, in the parameter "Q" which specifies image quality, like 1200dpi or 600dpi, an absolute value is not specified but it is specified with 16 steps of relative values. Therefore, if it is the printer which can respond to 1200dpi when "15" which means the highest image quality is specified, image quality will be set as 1200dpi, and if it is the printer which can respond to 600dpi, image quality will be set as 600dpi.

[0099] The page scope reply section 252 processes the command data ([p:inqa] command) about an inquiry of a page scope. The page scope reply section 252 will create the command data (command data ([p:rpla] command) about the reply of a page scope) for answering the range of the page printing field which can be set up with reference to the proper information memorized by the proper information storage section 244, if this command data is received. The created command data are sent to host equipment 2 through the communication link I/F section 241. In addition, the page scope reply section 252 is answered to the range of the page printing field which can be set up based on this multiplier, when the multiplier "D" is specified in the parameter unit of this command data.

[0100] The page format definition part 253 processes the command data ([p:make] command) about a page format definition. According to the content of the parameter unit contained in this command data, the page format definition part 253 creates the printing setting-out information about a page format of the size of a page printing field, the configuration method of a printing object, etc., and outputs this to the printing setting-out information storage section 245.

[0101] The object number issuance section 254 processes the command data ([o:req#] command) about the issuance demand of an object number. An object number is for managing a printing object according to an individual. The object number issuance section 254 creates command data (command data ([o:iss#] command) about issuance of an object number) for self to answer the manageable object number for several minutes simultaneously to the number of the object numbers specified in the parameter unit (the number of objects to demand). The created command data are sent to host equipment 2 through the communication link I/F section 241.

[0102] The object setting-out section 255 processes the command data ([o:mkim] command) about setting out of a printing object. According to the content of the parameter unit contained in this command data, the object setting-out section 255 creates the printing setting-out information about setting out of a printing object, and outputs this to the printing setting-out information storage section 245.

[0103] The page setup termination section 256 processes the command data ([p:endp] command) about termination of page setup. The post process of page setup will be performed and the page setup termination section 256 will notify that to the object demand section 261 mentioned later, if this command data is received.

[0104] Drawing 26 is a block flow diagram which shows the functional configuration of the printing processing section 46. In this drawing, in order that the object demand section 261 may require the data of a printing object from host equipment 2, it creates the command data ([d:dreq] command) about a data demand, and outputs them to the communication link I/F section 241. The object demand section 261 specifies a printing object according to the printing setting-out information memorized by the printing setting-out information storage section 45, and requires the data for every printing object. In this case, the object demand section 261 specifies the data length (byte count) of the data to demand. That is, the object demand section 261 specifies the printing object arranged to a printing page field according to the created printing setting-out information in order of a raster, determines the data length demanded according to the operating condition of the buffer given to the printing object, and requires it of host equipment using the object number of the printing object.

[0105] The data-processing section 262 processes the command data ([d:dsnd] command) about data transmission. That is, the data-processing section 262 makes the data-processing module 263 process the data of the printing object contained in the command data about the data transmission which answers the command data about a data demand and is sent from host

equipment 2 according to the printing setting-out information memorized by the printing setting-out information storage section 45, and outputs the bit map data of the raster format acquired eventually to image memory 264. The data-processing module 263 is equipped with the image expansion section 2631, the resolution converter 2632, the APF section 2633, and the color converter 2634 with this operation gestalt. In addition, as for the data-processing section 262, it is desirable to memorize the information about the what byte data it has a working area for several minutes of the published object number (buffer), and was acquired from host equipment 2, to what band eye it developed, or to the how many lines of bit map data it developed so that the data of a printing object can be processed, respectively.

[0106] The image expansion section 2631 develops the data of the printing object transmitted by compressed format (expanding), and restores them to the data of the original printing object. The resolution converter 2632 changes resolution according to the printing setting-out information memorized by the printing setting-out information storage section 245 in the data of the restored printing object. For example, when the expansion field of 2x3 (inch) is specified by the [o:mkim] command and the resolution of 720 (dpi) is indirectly specified by the [m:qlty] command, an image size will print the bit map data of 1440x2160 (dot). However, the image size of the printing object sent from host equipment 2 is not necessarily this size. For this reason, when smaller than the image size which the printing object sent from host equipment 2 should print, complement processing is performed, and infanticide processing is performed when larger than the image size which the printing object sent to reverse from host equipment 2 should print. These complement processing and infanticide processing shall be called resolution conversion here. In addition, with the "F" parameter of the [o:mkim] command, when specified that a printing object is exactly settled in an expansion field by changing an aspect ratio, a conversion rate (rate of a complement/infanticide) is changed in a lengthwise direction and a longitudinal direction, and resolution conversion is performed. The APF section 2633 amends an image according to the assignment, when the printing setting-out information about printing quality has APF assignment. There are for example, tone adjustment, saturation emphasis, sharpness, etc. in amendment of an image. Moreover, the statistical data of an image may be used. The color converter 2634 changes the data expressed in RGB each color of 8 bits into the data expressed in CMYK each color of 8 bits. In this case, when the reference table (LUT) for color conversion is specified as printing setting-out information, refer to this for the color converter 2634.

[0107] When the data-processing module 263 is made to process the data-processing section 262 and expansion of a printing object is ended, it notifies the object number of the printing object to the object release section 255. The object release section 255 notifies having released the printing object to the object number issuance section 254 while, outputting the command data ([o:rles] command) about object release in response. If an object number is released, the object number issuance section 254 will publish a new object number, and will send it to host equipment 2. Thereby, host equipment 2 can set up a printing object now based on the newly published object number.

[0108] Image memory 264 memorizes the bit map data of a raster format processed by the data-processing module 263. The engine control section 266 supplies the image data memorized by image memory 264 to the print engine section 247.

3-2 The functional block diagram 27 of host equipment is a block flow diagram which shows the functional configuration of host equipment 2. That is, this drawing expresses functionally the host equipment 2 shown in drawing 3.

[0109] The printing control section 271 performs control about progress of printing according to the printing initiation directions and printing interruption directions which are given from the user interface section 272 (it is equivalent to the user interface 34 of drawing 3 .). The printing control section 271 outputs the command data ([p:term] command) about page processing interruption to the communication link I/F section 273 to a printer 1, when interruption directions of printing are given.

[0110] The printing setting-out demand section 274 creates the command data ([m:qlty] command etc.) which include printing specification information in a parameter unit with reference to the printing specification information storage section 275, and outputs them to the

communication link I/F section 73. Printing specification information includes printing quality, the information about a page format, etc. Printing specification information is set up beforehand or is inputted from the user interface section 272.

[0111] If command data are received from a printer 1 through the communication link I/F section 273, the command interpretation section 276 will interpret the command contained in this command data, and it will control it so that processing according to that interpretation result is performed. The file access section 277 is for accessing the data storage section 278, and writing in or reading data. If the command data ([d:dreq] command) about a data demand are received, the file access section 277 will read the data of the printing object specified in the parameter unit from the data storage section 278, will create the command data ([d:dsnd] command) about the data transmission which contains this in a parameter unit, and will output them to the communication link I/F section 273. The input device 279 makes the data storage section 278 memorize the acquired image data through the file access section 277 according to the input directions given from the user I/F section 272.

[0112] Drawing 28 is a block flow diagram which shows the functional configuration of the printing setting-out demand section 73. In this drawing, the printing quality setting-out demand section 81 creates the command data about printing quality setting out based on the printing specification information memorized by the printing specification information storage section 74, and outputs this to the communication link I/F section 75. The page scope demand section 82 outputs command data concerning an inquiry in a page scope to the communication link I/F section 75. This command data is answered and the command data ([p:rpla] command) about the reply of the page scope sent from a printer 1 are inputted into the page format demand section 83 through the command interpretation section 76. The page format demand section 83 creates the command data ([p:mak] command) about a page format of the size of a page printing field, a configuration method, etc. according to the page scope acquired from the printing specification information and the printer 1 which were memorized by the printing specification information storage section 75. The object number demand section 84 outputs the command data ([o:req#] command) about the issuance demand of an object number in order to require a required object number of a printer 1 based on the printing specification information memorized by the printing specification information storage section 75. The command data ([o:iss#] command) about issuance of the object number which answers this command data and is sent from a printer 1 are inputted into the object setting-out demand section 85. The object setting-out demand section 85 creates the command data ([o:mkim] command) about setting out of a printing object based on the page format set up by the page format demand section 83. Setting out of a printing object is performed for every printing object identified by the object number. The advice section 86 of page setup termination creates the command data for notifying to a printer 1 that setting out of the printing specification for 1 page ([p:endp] command) was completed.

4 Explanation 4-1 of operation Printing setting-out processing drawing 29 is a timing chart for explaining printing setting-out processing of the print system concerning this operation gestalt.

(1) If printing initiation directions are given from a user, host equipment 2 will send the command data about printing quality setting out to a printer 1. A printer 1 creates the printing setting-out information concerning printing quality in this command data according to reception and the proper information on own.

(2) Host equipment 2 sends the command data about an inquiry of a page scope to a printer 1.

(3) A printer 1 will send the command data about the reply of a page scope to host equipment 2, if this command data is received.

(4) If a reply is received about a page scope, host equipment 2 will create a page format based on this page scope, and will send the command data about a page format to a printer 1. A printer 1 creates the printing setting-out information concerning reception and a page format in this command data.

(5) It sends the command data about the issuance demand of an object number to a printer 1 in order to require issuance of an object number required for printing of a printing object, after host equipment 2 requires a page format of a printer 1.

(6) A printer 1 sends the command data about issuance of an object number to host equipment 2

in order to notify the object number which can be treated simultaneously in person to host equipment 2, if the command data about the issuance demand of an object number are received.
(7) Host equipment 2 sends the command data about object setting out to a printer 1 about each of a printing object according to the object number permitted by the printer 1.

(8) Host equipment 2 sends the command data about page setup termination to a printer 1, after setting out for 1 page is completed by notifying setting out to a printer 1 about each of a printing object. A printer 1 starts following data transfer and printing processing by receiving this command data.

4-2 Data transfer and printing processing drawing 30 are the timing charts for explaining data transfer processing of the print system concerning this operation gestalt.

(1) A printer 1 sends the command data about a data demand to host equipment 2 in order to require the data of a printing object, if the command data about page setup termination are received.

(2) If the command data about a data demand are received, host equipment 2 will read the data of a printing object according to assignment of parameter data, and will send the command data about data transmission to a printer 1.

(3) Host equipment 2 sends the command data about page processing interruption to a printer 1 according to directions, error generating, etc. of a user. A printer 1 interrupts the processing, when printing processing (expansion processing is included.) is being carried out.

(4) A printer 1 outputs the command data about object release to host equipment 2 about all printing objects.

(5) In order to notify that processing interrupted the printer 1 about all printing objects to host equipment 2, send the command data about page processing termination to host equipment 2.

[0113] The above-mentioned operation gestalt is the instantiation for explaining this invention, and is not the meaning which limits this invention only to these operation gestalten. This invention can be carried out with various gestalten, unless it deviates from the summary. For example, although actuation of the above-mentioned functional implementation means was explained sequentially, it does not adhere to especially this. Therefore, unless conflict arises in actuation, you may constitute so that parallel operation of the sequence of processing may be replaced or carried out.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing showing the outline configuration of a print system

[Drawing 2] Drawing showing the hardware configuration of a printer

[Drawing 3] Drawing showing the hardware configuration of host equipment

[Drawing 4] Drawing for explaining the outline of a command

[Drawing 5] Drawing for explaining a printing quality setting-out command

[Drawing 6] Drawing for explaining a printing quality setting-out command

[Drawing 7] Drawing for explaining a custom LUT setting-out command

[Drawing 8] Drawing for explaining a page scope inquiry command

[Drawing 9] Drawing for explaining a page scope reply command

[Drawing 10] Drawing for explaining a page format definition command

[Drawing 11] Drawing for explaining a page processing quit command

[Drawing 12] Drawing for explaining an object number demand command

[Drawing 13] Drawing for explaining a page setup quit command

[Drawing 14] Drawing for explaining a page processing interruption command

[Drawing 15] Drawing for explaining an object number issuance command

[Drawing 16] Drawing for explaining an image object setting-out command

[Drawing 17] Drawing for explaining an image object setting-out command

[Drawing 18] Drawing for explaining an image object setting-out command

[Drawing 19] Drawing for explaining an image object setting-out command

[Drawing 20] Drawing for explaining an object release command

[Drawing 21] Drawing for explaining a data demand command

[Drawing 22] Drawing for explaining a data transmitting command

[Drawing 23] Drawing for explaining a data read-out repositioning command

[Drawing 24] The block flow diagram which shows the functional configuration of a printer

[Drawing 25] The block flow diagram which shows the functional configuration of the printing setting-out processing section

[Drawing 26] The block flow diagram which shows the functional configuration of the printing processing section

[Drawing 27] The block flow diagram which shows the functional configuration of host equipment

[Drawing 28] The block flow diagram which shows the functional configuration of the printing setting-out demand section

[Drawing 29] The timing chart for explaining printing setting-out processing of a print system

[Drawing 30] The timing chart for explaining data transfer processing of a print system

[Description of Notations]

1 — Printer

2 — Host equipment

3 — Parallel cable

4 — Network

241 — Communication link interface section

242 — Command interpretation section

243 — Printing setting-out processing section
244 — Proper information storage section
245 — Printing setting-out information storage section
246 — Printing processing section
247 — Print engine
271 — Printing control section
272 — User interface section
273 — Communication-interface section
274 — Printing setting-out demand section
275 — Printing specification information storage section
276 — Command interpretation section
277 — File access section
278 — Data storage section
279 — Input device section

[Translation done.]

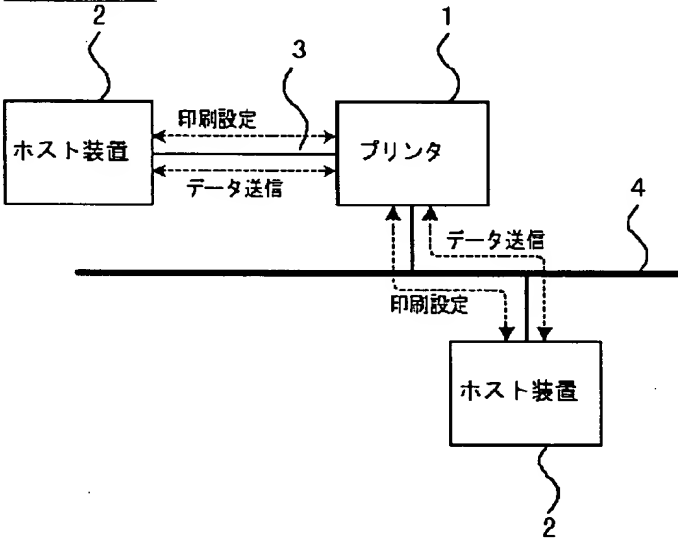
* NOTICES *

JP0 and NCIP1 are not responsible for any damages caused by the use of this translation.

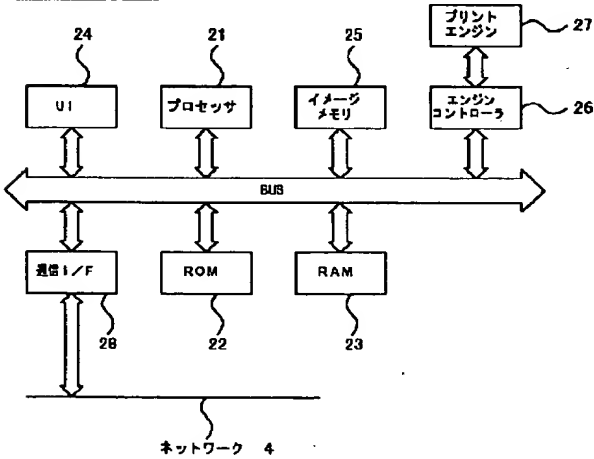
- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
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DRAWINGS

[Drawing 1]



[Drawing 2]



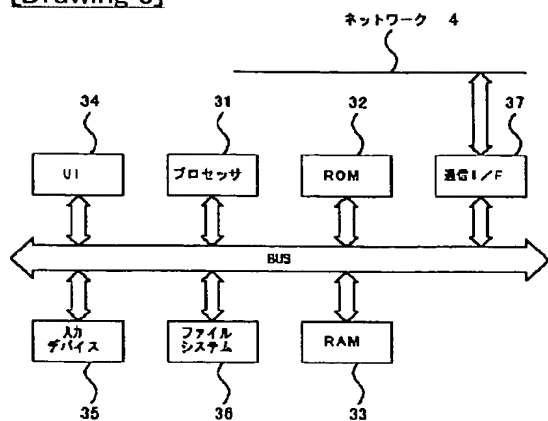
[Drawing 8]

[p:inqa] Inquire page availability host -> printer

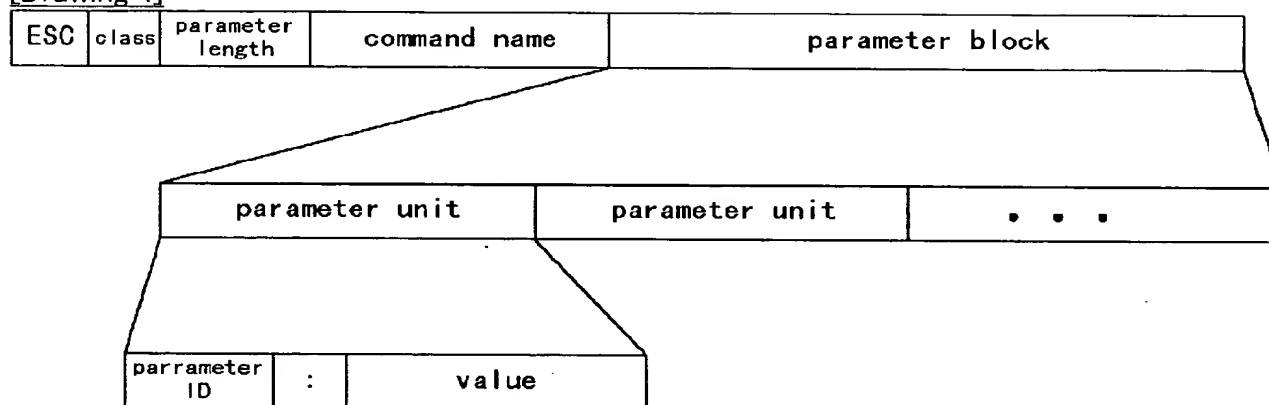
param. ID	value length	contents
--------------	-----------------	----------

D 2 denominator (denomi)

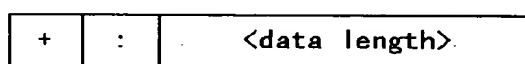
[Drawing 3]



[Drawing 4]



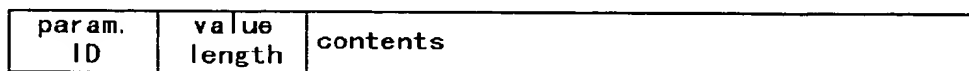
(a)



(b)

[Drawing 12]

[p:req#] request object numbers host → printer



N	2	number of object numbers (nobj)
---	---	---------------------------------

[Drawing 5]

[m:qlty] set printing quality

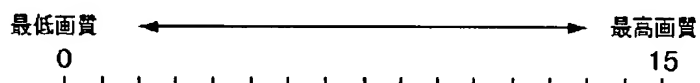
host -> printer

param. ID	value length	contents
--------------	-----------------	----------

M 2 media quality (media)

0	Plain Paper
1	Fine Paper
2	Super Fine Paper
3	Transparency
4	Glossy Film
5	Glossy Paper
6	Back Print Film

Q 1 quality (quality)



P 6 color management for photograph (cmpht)

T 6 color management for text and graph (cmtxt)

Br	Cn	St	R	G	B
----	----	----	---	---	---

Br: Brightness

Cn: Contrast

St: Saturation

R : Red

G : Green

B : Blue

B 1 black and white printing (bwprt)

0	カラー印刷
1	白黒印刷

[Drawing 6]

W 1 micro weave (mcrwev)

0	マイクロウィーブOFF
1	標準マイクロウィーブ
2-265	拡張マイクロウィーブ

D 1 printing direction control (directl)

0	双方向印刷
1	単方向印刷

H 1 halftone (hftone)

0	ディザ (高速)
1	誤差拡散 (高画質)

Z 1 dot size (dotsz)

H 2 horizontal resolution (hres)

V 2 vertical resollution (vres)

L 2 ID of user defined LUT (lut-id)

[Drawing 7]

[m:slut] set user defined LUT

host -> printer

param. ID	value length	contents
--------------	-----------------	----------

I 2 ID (id)

+ 4 data length (dtlen)

[Drawing 9]

[p:rpla] reply page availabillity

host <- printer

param. ID	value length	contents
--------------	-----------------	----------

D 2 denominator (denomi)

W 4 maximum width (width)
H 4 maxiimum height (height)

T 4 minimum top margin (tmrgin)

L 4 left margin (lmrgin)

R 4 minimum right margin (rmrgin)

B 4 minimum bottom margin (bmrgin)

[Drawing 11]

[p:fini] page finished

host <- printer

param. ID	value length	contents
--------------	-----------------	----------

S 2 Status (status)

0	正常終了
1	異常終了
2	[p:term]による中断
3	処理終了後に[p:term]を受信

[Drawing 15]

[o:iss#] issue object numbers

host <- printer

param. ID	value length	contents
--------------	-----------------	----------

N 2 number of object numbers (nobj#)
2 object number (obj#)

[Drawing 10]

[p:make] make page

host -> printer

param. ID	value length	contents
--------------	-----------------	----------

D 2 denominator (denomi)

W 4 width (width)
H 4 height (height)

T 4 top margin (tmrgin)

A 1 arrangement

0	自動配置
1	個別指定
2	垂直方向直列配置

H 2 horizontal division (hdiv)
V 2 vertical division (hdiv)

X 1 horizontal padding ratio (hpadd)
Y 1 vertical padding ratio (vpadd)

[Drawing 13]

[p:endp] end of page

host -> printer

param. ID	value length	contents
--------------	-----------------	----------

S 1 eject (eject)

0	印刷終了後に排紙しない
1	印刷終了後に排紙する

[Drawing 14]

[p:term] terminate page

host -> printer

param. ID	value length	contents
--------------	-----------------	----------

E 1 eject (eject)

0	中断後に排紙しない
1	中断後に排紙する

[Drawing 16]

[o:mkim] make image object

host -> printer

param. ID	value length	contents
--------------	-----------------	----------

2 object number (obj#)

D 2 denominator (denomi)

X 4 horizontal position (xpos)

Y 4 vertical position (ypos)

W 4 printing area width (width)

H 4 printing area height (height)

R 1 rotate (rotate)

0	回転なし
1	時計方向に90度
2	180度
3	反時計方向に90度
4	回転なしまたは時計方向に90度
5	回転なしまたは反時計方向に90度

F 1 aspect fitting (aspfit)

0	画像データに合わせる
1	オブジェクト展開領域に合わせる
2	画像データ、オブジェクト展開領域とも合わせる

[Drawing 17]

A 2 alignment (align)

上位バイト：上下方向配置

0	上端を合わせる
1	中央を合わせる
2	下端を合わせる

下位バイト：左右方向配置

0	左端を合わせる
1	中央を合わせる
2	右端を合わせる

Q 1 quick decoding (quick)

0	高速展開を行わない
1	高速展開を行う

I 1 intent (intent)

0	写真
1	テキスト/グラフ

Z 4 size of image data (dtsize)

[Drawing 20]

[o:rls] release object

host <- printer

param. ID	value length	contents
--------------	-----------------	----------

2 object number (obj#)

S 2 status (status)

0	正常終了
1	異常終了
2	ページ処理中断による終了

[Drawing 18]

P 2 photo creation (photor)

0	APFを適用しない
1	APFを適用する
2	簡易APFを適用する

下位バイト: APF適用項目

—	MH	MS	MG	S	D	T
---	----	----	----	---	---	---

T: トーン (0: 標準、1: 硬調、2: セピア調)

D: デジタルカメラ用補正

S: シャープネス (0: オフ、1: オン)

MG: 記憶色補正・緑 (0: オフ、1: オン)

MS: 記憶色補正・空 (0: オフ、1: オン)

MH: 記憶色補正・肌色 (0: オフ、1: オン)

S 16 statisical data (stsdatt)

T 12 trimming guide (trimgd)

OH	OV	TH	TV
L	W		

OH: 水平方向オフセット

OV: 垂直方向オフセット

TH: 水平方向トリム量 (符号付き)

TV: 垂直方向トリム量 (符号付き)

L: 長さ

W: 太さ

B 6 border line

OH	OV	W
----	----	---

OH: 水平方向オフセット

OV: 垂直方向オフセット

W: 太さ

[Drawing 19]

B 6 border line

OH	OV	W
----	----	---

OH: 水平方向オフセット

OV: 垂直方向オフセット

W :太さ

> 9 style of caption 1 (style1)

) 9 style of caption 2 (style2)

offset	pos	pitch	size	R	G	B
-	-	-	-	I	A	P

< 48 text string of caption 1 (str1)

(48 text string of caption 2 (str2)

[Drawing 21]

[d:dreq] data request

host ← printer

param. ID	value length	contents
--------------	-----------------	----------

2 object number (obj#)

L 4 requested length (reqlen)

[Drawing 22]

[o:dsnd] send data

host → printer

param. ID	value length	contents
--------------	-----------------	----------

2 object number (obj#)

S 2 status (status)

0	正常
1	EOF
2	データ要求のオブジェクト番号が不正

+ 4 data length (dtlen)

[Drawing 23]

[o:seek] seek

host <- printer

param. ID	value length	contents
--------------	-----------------	----------

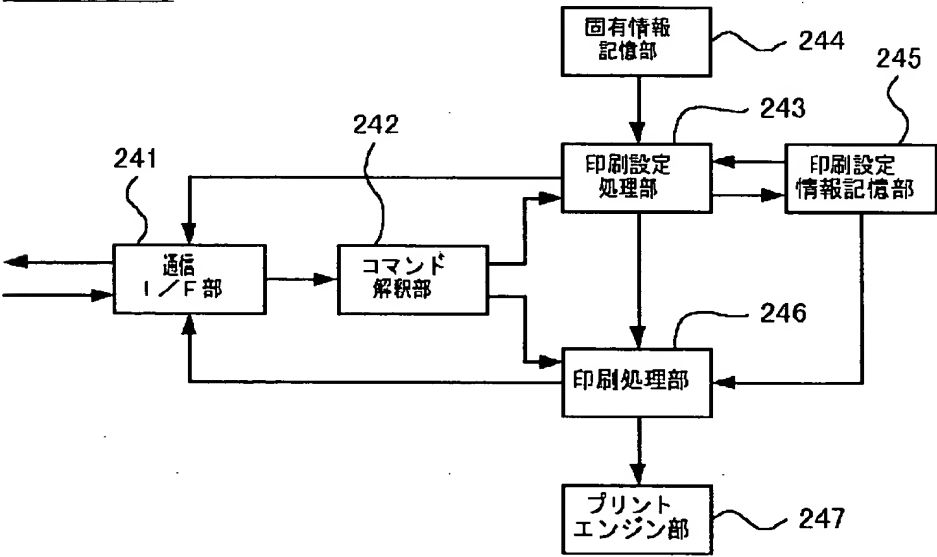
#	2	object number (obj#)
---	---	----------------------

0	2	origin (origin)
---	---	-----------------

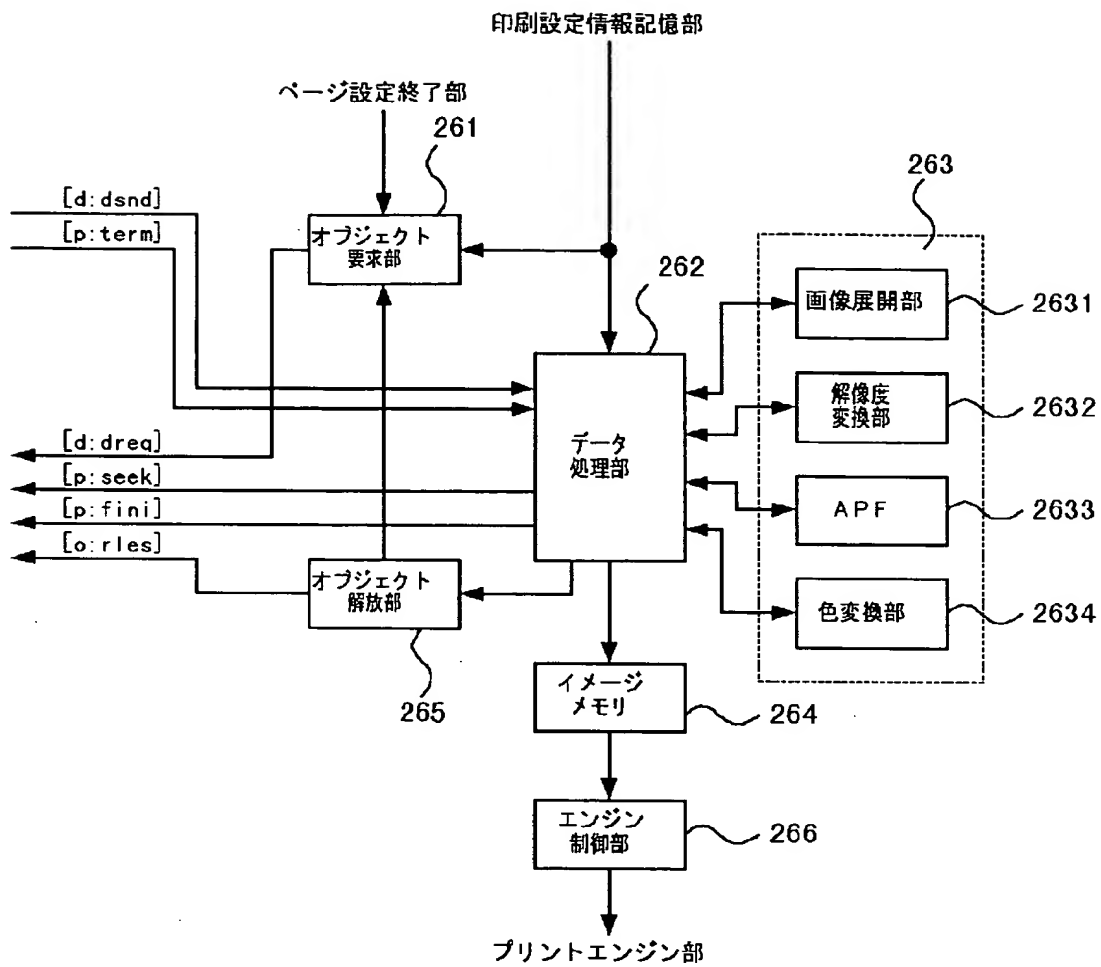
0	データの先頭
1	現在の読み出し位置
2	データの終端

L	4	offset
---	---	--------

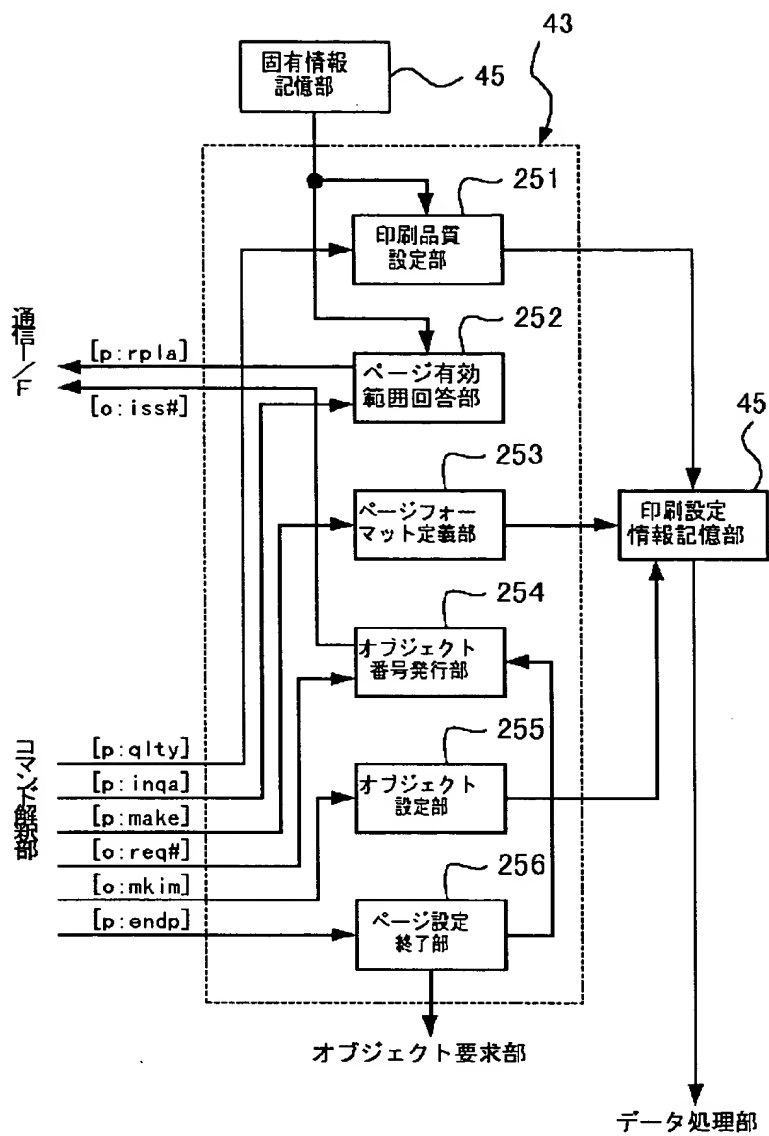
[Drawing 24]



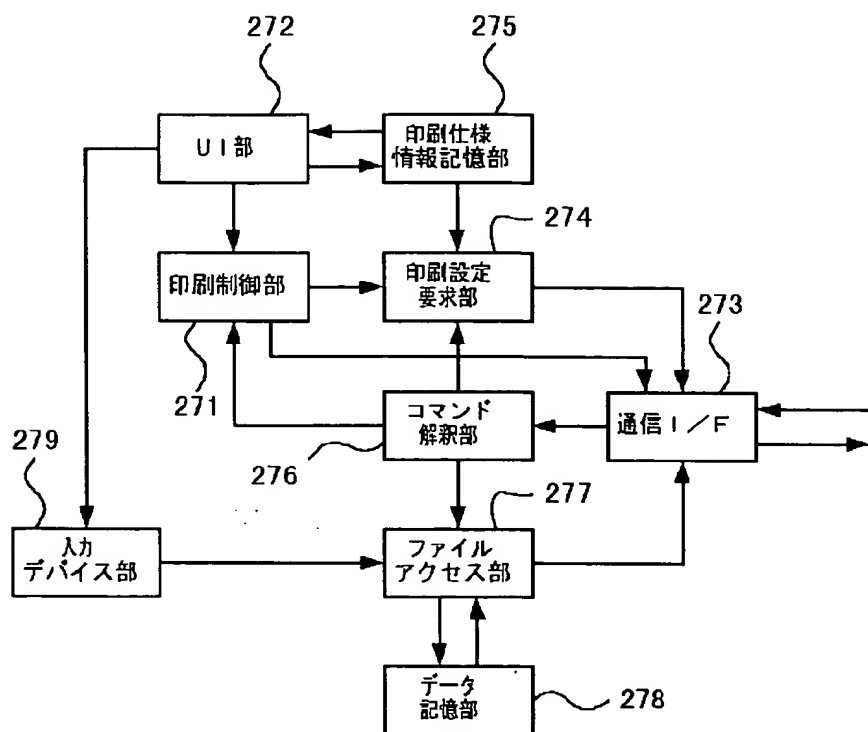
[Drawing 26]



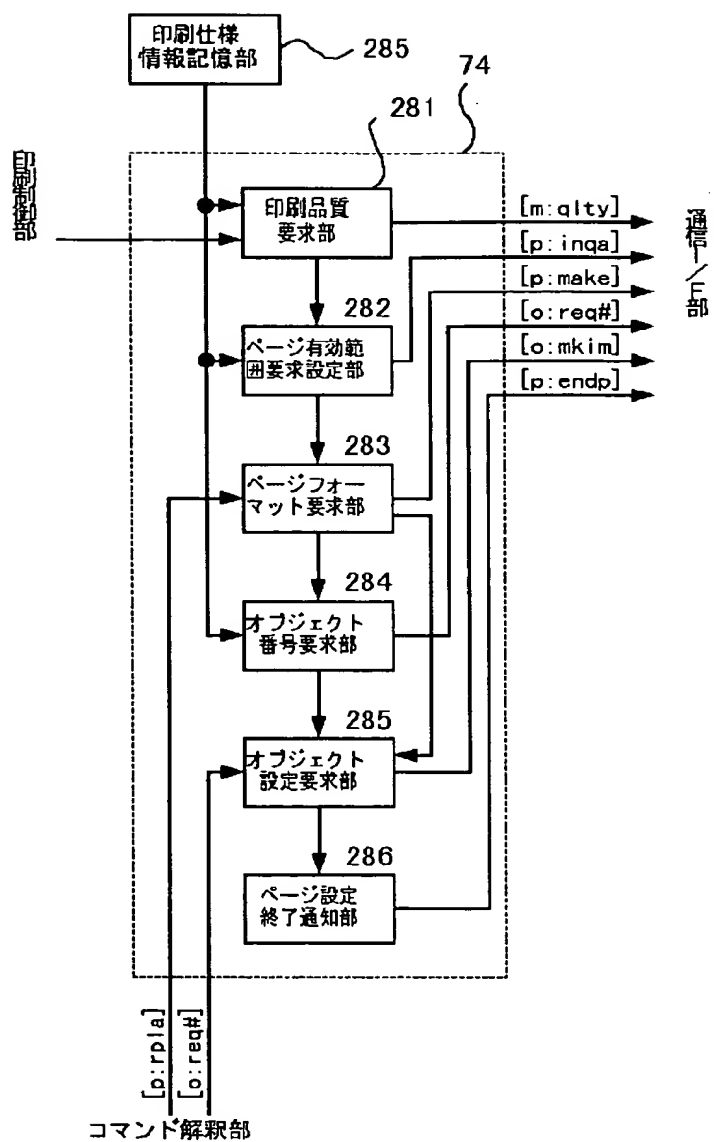
[Drawing 25]



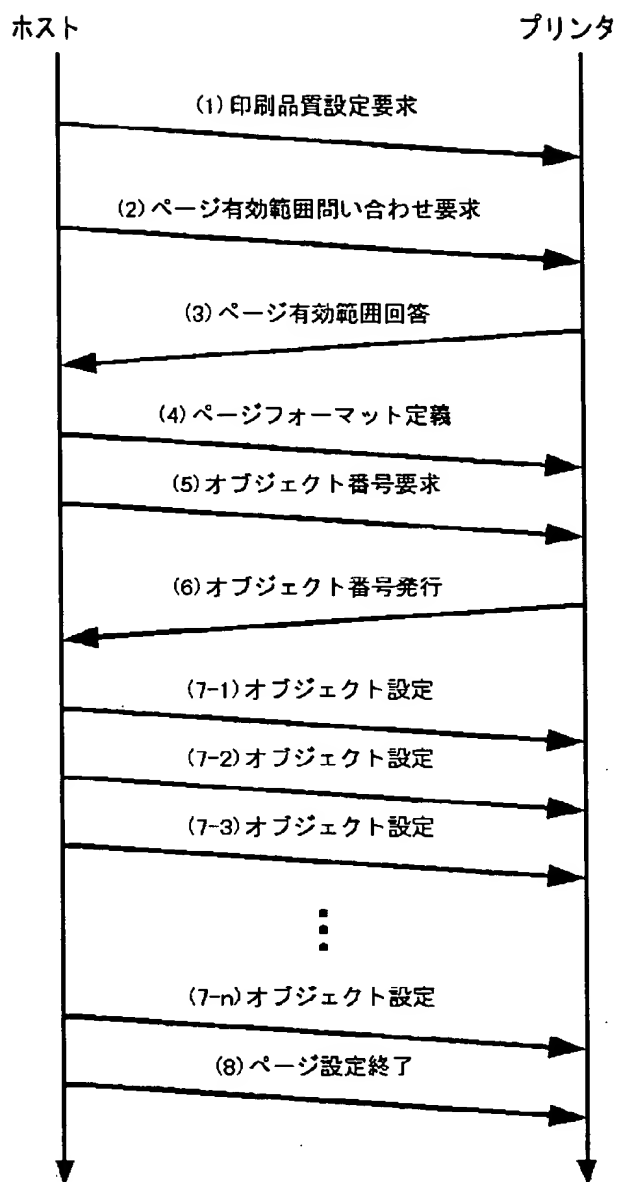
[Drawing 27]



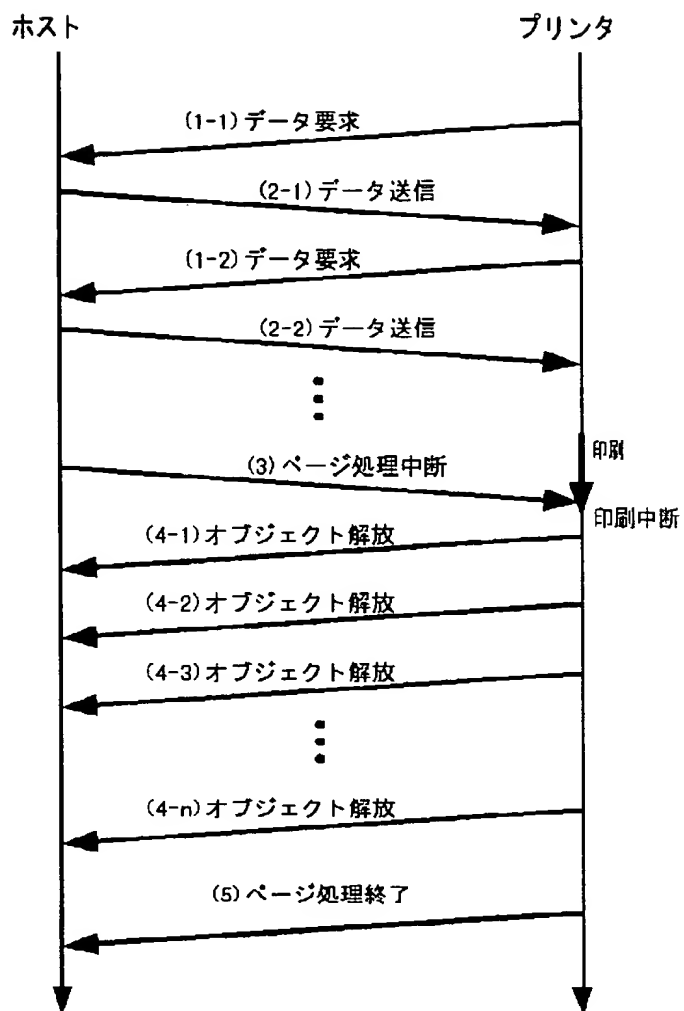
[Drawing 28]



[Drawing 29]



[Drawing 30]



[Translation done.]

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C 2 C 0 6 1

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B 4 1 J 29/38

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(71) 出願人 000002369

セイコーエプソン株式会社

東京都新宿区西新宿2丁目4番1号

(72) 発明者 石田 悟郎

長野県諏訪市大和3丁目3番5号 セイコーエプソン株式会社内

(74) 代理人 100079108

弁理士 稲葉 良幸 (外2名)

Fターム(参考) 2C061 AP01 AQ06 AR01 HJ08 HN22

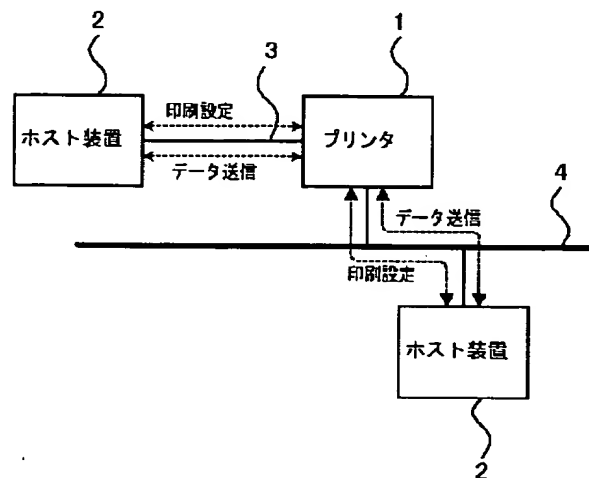
5B021 AA01 AA02 BB01 CC05

(54) 【発明の名称】 プリンタおよび印刷制御方法並びにプログラムを記録した記録媒体

(57) 【要約】

【課題】 本発明の課題は、ホスト装置が従来のようなプリンタドライバを必要とすることなく、ホスト装置上のドキュメントデータをプリンタに印刷させることができるようにすることである。

【解決手段】 本発明は、ホスト装置から送られる印刷設定情報を受け取り、前記印刷設定情報で指定された印刷対象データを前記ホスト装置に要求し、前記要求に従って前記ホスト装置から送られる印刷対象データを受け取り、前記印刷設定情報および前記印刷対象データに基づいて印刷を行うプリンタにおいて、前記印刷対象データに基づいて印刷を行っている間に、ホスト装置から印刷中断情報を受け取った場合に、前記印刷を中断することを特徴とするプリンタである。



【特許請求の範囲】

【請求項 1】 ホスト装置から送られる印刷設定情報を受け取り、

前記印刷設定情報で指定された印刷対象データを前記ホスト装置に要求し、

前記要求に従って前記ホスト装置から送られる印刷対象データを受け取り、

前記印刷設定情報および前記印刷対象データに基づいて印刷を行うプリンタであって、

前記印刷対象データに基づいて印刷を行っている間に、ホスト装置から印刷中断情報を受け取った場合に、前記印刷を中断することを特徴とするプリンタ。

【請求項 2】 ホスト装置から送られる印刷設定情報を受け付ける第 1 の受付手段と、

前記印刷設定情報で指定された印刷対象データを前記ホスト装置に要求する要求手段と、

前記要求に従って前記ホスト装置から送られる印刷対象データを受け付ける第 2 の受付手段と、

前記印刷設定情報に基づいて前記印刷対象データに基づくビットマップデータを生成する生成手段と、

前記ビットマップデータに基づいて印刷記録媒体に対する印刷を行う印刷手段とを備えたプリンタであって、

前記印刷対象データに基づいて印刷を行っている間に、ホスト装置から印刷中断情報を受け取った場合に、前記印刷を中断することを特徴とするプリンタ。

【請求項 3】 前記プリンタは、

前記印刷を中断した場合に、前記印刷処理終了に関する情報を前記ホスト装置に送ることを特徴とする請求項 2 記載のプリンタ。

【請求項 4】 ホスト装置から送られる印刷設定情報を受け取り、

前記印刷設定情報で指定された印刷対象データを前記ホスト装置に要求し、

前記要求に従って前記ホスト装置から送られる印刷対象データを受け取り、

前記印刷設定情報および前記印刷対象データに基づいて印刷を行うプリンタの印刷制御方法であって、

前記印刷対象データに基づいて印刷を行っている間に、ホスト装置から印刷中断情報を受け取った場合に、前記印刷を中断することを特徴とする印刷制御方法。

【発明の詳細な説明】**【0001】**

【発明の属する技術分野】 本発明は、プリンタの技術に関する。また、本発明は、ホスト装置とプリンタとの間の通信で用いられる特定のコマンド体系に基づく処理制御の技術に関する。

【従来技術】 パーソナルコンピュータに代表されるホスト装置がアプリケーションデータをプリンタに印刷させるためには、ホスト装置は、プリンタごとに用意されたプリンタドライバ（プリンタ制御用プログラム）を必要

とする。プリンタドライバは、アプリケーションプログラムからアプリケーションデータを受け取ると、プリンタ固有のプリントジョブデータに変換して、そのプリンタに対して出力する。プリンタは、このプリントジョブデータを受け取ると、これを解釈してラスタ形式のビットマップデータを生成し、印刷用紙に対するプリントを実現する。

【0002】 また、典型的な情報処理システムでは、ホスト装置を中心にしてその周囲に、プリンタやスキャナ、デジタルカメラなどの電子機器が配置される。電子機器ごとの固有のドライバ（デバイスドライバ）が組み込まれたホスト装置は、これら電子機器との間で情報を仲介する。例えば、デジタルカメラに記憶されたイメージデータの印刷に際しては、ホスト装置は、このデジタルカメラに記憶されたイメージデータを、一旦、アプリケーションプログラムに読み込んで、このアプリケーションプログラムからプリンタドライバを介してプリントジョブデータに変換してプリンタに出力する。

【発明が解決しようとする課題】 プリンタドライバのプログラムサイズは、通常、数百KByte以上である。従って、プロセッサの性能に優れ、メモリ容量の豊富なコンピュータなどのホスト装置では、プリンタドライバを組み込むことについて何ら問題はない。しかしながら、例えば、デジタルカメラのような小型の電子機器では、プリンタドライバを組み込むことは、ハードウェア上の制約などにより困難である。

【0003】 そこで、本発明は、ホスト装置が従来のようなプリンタドライバを必要とすることなく、ホスト装置上のドキュメントデータをプリンタに印刷させることができるようにすることを目的とする。

【0004】 また、本発明は、特定のコマンド体系に基づくホスト装置とプリンタとの間の新たな通信プロトコルを提供することを目的とする。

【課題を解決するための手段】 上記課題を解決するために、本発明は以下のように特定される。

【0005】 すなわち、本発明は、ホスト装置から送られる印刷設定情報を受け取り、前記印刷設定情報で指定された印刷対象データを前記ホスト装置に要求し、前記要求に従って前記ホスト装置から送られる印刷対象データを受け取り、前記印刷設定情報および前記印刷対象データに基づいて印刷を行うプリンタであって、前記印刷対象データに基づいて印刷を行っている間に、ホスト装置から印刷中断情報を受け取った場合に、前記印刷を中断することを特徴とするプリンタである。

【0006】 また、本発明は、ホスト装置から送られる印刷設定情報を受け付ける第 1 の受付手段と、前記印刷設定情報で指定された印刷対象データを前記ホスト装置に要求する要求手段と、前記要求に従って前記ホスト装置から送られる印刷対象データを受け付ける第 2 の受付手段と、前記印刷設定情報に基づいて前記印刷対象デー

タに基づくビットマップデータを生成する生成手段と、前記ビットマップデータに基づいて印刷記録媒体に対する印刷を行う印刷手段とを備えたプリンタであって、前記印刷対象データに基づいて印刷を行っている間に、ホスト装置から印刷中断情報を受け取った場合に、前記印刷を中断することを特徴とするプリンタである。

【0007】ここで、前記プリンタは、前記印刷を中断した場合に、前記印刷処理終了に関する情報を前記ホスト装置に送ることを特徴とする。さらに、本発明は、ホスト装置から送られる印刷設定情報を受け取り、前記印刷設定情報で指定された印刷対象データを前記ホスト装置に要求し、前記要求に従って前記ホスト装置から送られる印刷対象データを受け取り、前記印刷設定情報および前記印刷対象データに基づいて印刷を行うプリンタの印刷制御方法であって、前記印刷対象データに基づいて印刷を行っている間に、ホスト装置から印刷中断情報を受け取った場合に、前記印刷を中断することを特徴とする印刷制御方法である。

【0008】なお、本発明は、プログラム製品またはプログラムを記録した記録媒体としても成立する。なお、前記記録媒体とは、例えば、ハードディスク（HD）、DVD-RAM、フレキシブルディスク（FD）やCD-ROM等のほかに、RAMやROM等のメモリ、ネットワークなどの伝送媒体を含む。

【発明の実施の形態】次に、本発明の実施の形態について、図面を参照しつつ説明する。

1 構成

1-1 プリントシステムの構成

図1は、本実施形態に係るプリントシステムの構成を示す図である。同図に示すように、プリンタ1は、パラレルケーブルなどの専用線3を介してホスト装置2とローカル接続され、またはLANなどのネットワーク4を介してホスト装置2とネットワーク接続される。ホスト装置2は、典型的には、デジタルカメラやスキャナなどの電子機器に置き換えることができるが、汎用のパーソナルコンピュータであってもよい。以下では、プリンタ1とホスト装置2に位置付けされるデジタルカメラとがネットワーク4に接続されたプリントシステムを例に説明する。

1-2 プリンタの構成

図2は、プリンタ1のハードウェア構成を示す図である。同図に示すように、プリンタ1は、プロセッサ21、ROM22、RAM23、ユーザインターフェース24、イメージメモリ25、エンジンコントローラ26、プリントエンジン27および通信インターフェース（以下「通信I/F」という。）28を備える。プロセッサ21は、ROM22に記憶されたプログラムを実行することにより、他のハードウェアと共働して、プリンタ1に所定の機能を実現させる。例えば、プロセッサ21は、後述するように、ホスト装置2から送られるコマ

ンドを解釈して、そのコマンドに応じた各種の処理を実行する。典型的には、プロセッサ21は、ホスト装置2から送られる印刷対象のデータをラスタ形式のビットマップデータに変換し、イメージメモリ25に出力する。RAM23は、プロセッサ21の主記憶装置として機能するものである。ユーザインターフェース24は、例えば、各種印刷設定を行うための表示パネルおよび操作ボタンなどによって構成され、ユーザによる対話的操作を可能にする。イメージメモリ25は、印刷に必要なビットマップデータを所定のバンド数単位で記憶する。エンジンコントローラ26は、イメージメモリ25に記憶されたビットマップデータをプリントエンジン27に供給する。プリントエンジン27は、例えば、紙送り機構やプリントヘッドなどによって構成され、紙などの印刷記録媒体に印刷を行うものである。プリントエンジン27は、レーザプリンタやシリアルプリンタといったプリンタの種類に応じたものを用いることができる。通信I/F28は、ネットワーク4に物理的に接続され、ホスト装置2との間でネットワーク通信を可能にするためのものである。

1-3 ホスト装置の構成

図3は、ホスト装置2のハードウェア構成を示す図である。同図に示すように、ホスト装置2は、プロセッサ31、ROM32、RAM33、ユーザインターフェース34、入力デバイス35、ファイルシステム36および通信I/F37を備え、これらは内部バスを介して相互に接続されている。プロセッサ31は、ROM32に記憶されたプログラムに従って、ホスト装置2全体の動作を制御する。RAM33は、プロセッサ31の主記憶装置として機能するものである。ユーザインターフェース34は、例えばデジタルカメラであれば、表示パネルや操作ボタンなどによって構成され、ユーザによる対話的操作を可能にする。入力デバイス35は、ユーザインターフェース34から与えられるユーザによる撮像指示に従い、CCDによって撮像して得られるイメージデータを内部バスに入力する。ファイルシステム36は、例えば、フラッシュメモリやハードディスクによって構成されるいわゆる外部記憶装置であり、入力デバイス35によって取り込まれたイメージデータを所定のフォーマットで記憶する。通信I/F37は、ネットワーク4に物理的に接続され、プリンタ1との間でネットワーク通信を可能にするためのものである。

2 コマンドの説明

本実施形態に係るプリントシステムにおいては、ホスト装置2とプリンタ1とが所定のコマンド体系に基づく通信を行って、印刷処理を進めていく。以下、本実施形態に係るプリントシステムで定義されるコマンドを説明する。

2-1 コマンドの概要

図4は、本実施形態に係るプリントシステムに使用され

るコマンドデータの概略を説明するための図である。同図に示すように、本実施形態におけるコマンドデータは、可変長のデータ列で構成される。以下、図中の各領域について説明する。

【0009】ESC：バイト列の先頭マーカ（コントロールコード“ESC”，1Bh）

class：コマンドの分類を表す1バイトのASCIIコード
classは以下のように分類される。

【0010】d：data

m：model dependent

o：object

p：page

parameter length：パラメータブロックの長さ（バイト数）

command name：コマンド名を表す4バイトの文字列
classとの組み合わせでコマンドを識別する。

【0011】parameter block：パラメータブロック
任意の個数のパラメータユニットから構成される。

【0012】parameter unit：パラメータユニット
パラメータの種類を示す1バイトのparameter ID、区切り文字“：”および値valueで構成される。

【0013】コマンドは、それぞれ各パラメータの値のサイズが規定される。また、パラメータの値として2バイト以上の数値を用いる場合は、各コマンドの定義で特に示さない限りビッグエンディアンとする。

【0014】また、パラメータブロック中に同図（b）の形式のパラメータを含む場合には、“data length”で示されたバイト数のバイナリデータがパラメータブロックの後に続く。このバイナリデータのサイズは、“parameter length”には含まれない。

【0015】以降の説明では、コマンドを“[class:command name]”の形式で表す。例えば、[p:make]は、classが“p”、command nameが“make”であることを意味する。

2-2 各コマンドの説明

（1）[m:qlty] set printing quality 印刷品質設定（図5および図6）

本コマンドは、ホスト装置2からプリンタ1に対して送られる。本コマンドは、印刷条件を設定するためのものである。プリンタが特定され、ホスト装置が機種固有の情報を把握している場合と、機種に依存せずに設定する場合とで、パラメータの内容が異なる。

【0016】M：用紙品質を指定する。設定可能な値の範囲および対応する用紙の種類は、機種によって異なる。

【0017】Q：印刷品質を16段階で指定する。

【0018】P，T：写真画像オブジェクト、およびテキスト・グラフ画像オブジェクトそれぞれの色補正を指定するパラメータを順に送る。各パラメータは、符号付き1バイトで、-50～+50の範囲とする。-50より

り小さい値が指定された場合は、-50が指定されたものとして扱う。+50が指定された場合は、+50が指定されたものとして扱う。

【0019】B：カラー印刷／白黒印刷を指定する。

【0020】W：マイクロウィーブ印刷のオン／オフを指定する。拡張マイクロウィーブとして指定できる範囲および対応するマイクロウィーブの種類は、機種によって異なる。

【0021】D：印刷方向制御の方式を指定する。

【0022】H：ハーフトーン処理の種類を指定する。

【0023】Z：ドットサイズを指定する。設定可能な値の範囲および対応するドットサイズは、機種によって異なる。

【0024】H，T：水平・垂直方向の印刷解像度をdpi（dot per inch）で指定する。設定可能な値の範囲およびデフォルト値は機種によって異なる。また、水平・垂直のどちらか一方のみの指定の場合は、どちらもデフォルト値となる。

【0025】L：色変換に用いる参照テーブルとして、[m:slut]で設定したユーザ定義LUTのIDを指定する。指定可能な範囲は、プリンタの機種によって異なる。また、lut-idが指定されていない場合は、用紙の種類や印刷品質に合わせて、プリンタ1が判断し、プリンタ1に内蔵されたLUTを用いる。

（2）[m:slut] set user defined LUT ユーザ定義LUT設定（図7）

本コマンドは、ホスト装置2からプリンタ1に対して送られる。本コマンドは、色変換に用いるLUTとして、ユーザ定義のものをプリンタに設定するためのものである。

【0026】I：LUTのID番号を指定する。設定可能なID番号の範囲およびID番号に対応するLUTの記憶先の種類は、機種によって異なる。対応しないID番号を指定した場合、本コマンドは無視される。

【0027】+：LUTデータの長さを示す。

【0028】本コマンドに続くdtlenバイトのバイナリデータがLUTデータとして扱われる。LUTデータのフォーマットは、機種によって異なる。

（3）[p:inqa] inquire page availability ページ有効範囲問い合わせ（図8）

本コマンドは、ホスト装置2からプリンタ1に対して送られる。本コマンドは、ページ印刷領域の設定可能な範囲および配置の回答をプリンタ1に要求するためのものである。プリンタ1は、本コマンドに対して[p:rpla]コマンドで回答する。

【0029】D：この問い合わせに対する回答で用いる分母を指定する。指定されない場合は、プリンタの規定値を用いる。

（4）[p:rpla] reply page availability ページ有効範囲回答（図9）

本コマンドは、プリンタ1からホスト装置2に対して送られる。本コマンドは、[p:inqa]コマンドによる問い合わせに対して、ページ印刷領域の設定可能な範囲を回答するためのものである。

【0030】D:[p:inqa]コマンドによって指定された値で、以下の各パラメータの分母を表す。ただし、[p:inqa]コマンドで指定された値を用いたときに分子の値が4バイトに収まらない場合や、[p:inqa]コマンドで0が指定された場合、または[p:inqa]コマンドでdenomiが指定されていない場合は、プリンタの既定値を用いて回答する。

【0031】W, H: 設定可能なページ印刷領域の最大幅および最大長を示す。

【0032】最大幅=width/denomi (inch)

最大長=height/denomi (inch)

なお、最大幅および最大長が整数にならない場合は、切り捨てて回答する。

【0033】T: 用紙上端からページ印刷領域の上端までの距離(トップマージン)の設定可能な最小値を示す。

【0034】

トップマージン最小値=tmrgin/denomi (inch)

なお、トップマージン最小値が整数にならない場合は、切り捨てて回答する。

【0035】L: 用紙左端からページ印刷領域の水平方向開始位置までの距離(レフトマージン)を示す。

【0036】

レフトマージン=lrgin/denomi (inch)

なお、レフトマージンが整数にならない場合は、切り捨てて回答する。

【0037】R: 用紙右端からページ印刷領域の右端までに必要な最小の距離(ライトマージン最小値)を示す。用紙右端からページ印刷領域右端までの距離がライトマージン最小値を下回るようなページ印刷領域の設定を行った場合の処理は、機種に依存する。

【0038】

ライトマージン最小値=rmrgin/denomi (inch)

なお、ライトマージン最小値が整数にならない場合は、切り捨てて回答する。

【0039】B: 用紙下端からページ印刷領域の下端までに必要な最小の距離(ボトムマージン最小値)を示す。用紙下端からページ印刷領域下端までの距離がボトムマージン最小値を下回るようなページ印刷領域の設定を行った場合の処理は、機種に依存する。

【0040】

ボトムマージン最小値=bmrgin/denomi (inch)

なお、ボトムマージン最小値が整数にならない場合は、切り捨てて回答する。

(5) [p:make] make page ページフォーマット定義 (図10)

本コマンドは、ホスト装置2からプリンタ1に対して送られる。本コマンドは、ページ印刷領域のサイズを設定するとともに、印刷オブジェクトの配置方法を指定するためのものである。ホスト装置2は、ページ印刷領域を格子状に分割し、各セルに印刷オブジェクトを配置していく“自動配置”と、印刷オブジェクトごとに位置を指定する“個別指定”のどちらかを指定し、“自動配置”の場合は、ページ印刷領域を水平・垂直方向にそれぞれいくつに区切るかを指定する。

【0041】D: 以下の各パラメータの分母を表す。

【0042】W, H: ページ印刷領域の幅および長さを指定する。

【0043】

幅=width/denomi (inch)

長さ=height/denomi (inch)

最大値を超える幅および/または長さが指定された場合は、最大幅および/または最大長が設定されたものとして扱う。denomiが指定されていない場合や0が指定された場合は、widthおよびheightは、[m:qlty]コマンドで指定されている解像度におけるドット数として扱う。

【0044】T: 用紙上端からページ印刷領域の上端までの距離(トップマージン)を指定する。

【0045】

トップマージン=tmrgin/denomi (inch)

最小値を下回るトップマージンが指定された場合は、プリンタ1は、最小値が設定されたものとして扱う。また、denomiが指定されていない場合や0が指定された場合は、tmrginは、[m:qlty]コマンドで指定されている解像度におけるドット数として扱う。

【0046】A: 印刷オブジェクトの配置方法を指定する。なお、“垂直方向直列配置”の場合は、単方向通信による画像データの転送を行う。

【0047】H, V: 水平方向、垂直方向の分割数を指定する。これらが指定されていない場合や0が指定された場合は、“自動配置”にはならない。印刷オブジェクトの配置方法が“自動配置”以外の場合は、これらのパラメータは無視される。

【0048】X, Y: 分割された各領域間の余白として取る部分の割合をパーセンテージで指定する。指定されていない場合や100異常の値が指定された場合は、0が指定されたものとして扱う。印刷オブジェクトの配置方法が“自動配置”以外の場合は、これらのパラメータは無視される。

(6) [p:proc] proceed 印刷進行

本コマンドは、ホスト装置2からプリンタ1に対して送られる。本コマンドは、それまでに設定した画像オブジェクトの印刷を実行するように指示するためのものである。

(7) [p:fini] page finished ページ処理終了 (図11)

本コマンドは、プリンタ1からホスト装置2に対して送られる。本コマンドは、[p:endp]コマンドまでに設定された印刷情報について、展開処理が終了したことを通知するためのものである。

(8) [o:req#] request object numbers オブジェクト番号要求 (図12)

本コマンドは、ホスト装置2からプリンタ1に対して送られる。本コマンドは、印刷オブジェクトの設定に使用する“オブジェクト番号”の発行をプリンタに要求するためのものである。プリンタ1は、本コマンドで要求した数に達するまで、1または複数回、[o:iss#]コマンドによりオブジェクト番号を発行する。

(9) [p:endp] end of page ページ設定終了 (図13)

本コマンドは、ホスト装置2からプリンタ1に対して送られる。本コマンドは、1ページ分の印刷情報設定が終了したことを通知するためのものである。本コマンドを受信した場合、[o:req#]コマンドで要求した数のオブジェクト番号が、まだ[o:iss#]コマンドで発行されていない場合、残りの分についての発行は行われない。また、[o:iss#]コマンドでプリンタからオブジェクト番号が発行されたにもかかわらず、まだ[o:make]コマンドで使用されていないオブジェクト番号があった場合、そのオブジェクト番号は無効となる。

(10) [p:term] terminate page ページ処理中断 (図14)

本コマンドは、ホスト装置2からプリンタ1に対して送られる。本コマンドは、印刷中のページの処理を中断させるためのものである。プリンタ1は、処理中のすべての印刷オブジェクトについて中断処理を行い、各印刷オブジェクトについて[o:rles]コマンドで処理終了をホスト装置2に通知する。すべての印刷オブジェクトの処理を中断した後、[p:fini]コマンドでページ処理の中断が完了したことをホスト装置2に通知する。[o:req#]コマンドで要求した数のオブジェクト番号がまだ[o:iss#]コマンドで発行されていない場合、残りの分についての要求はキャンセルとしたものみなされる。また、[o:iss#]コマンドでプリンタ1からオブジェクト番号が発行されたにもかかわらず、まだ[o:make]コマンドで使用されていないオブジェクト番号があった場合、そのオブジェクト番号は無効となる。

(11) [o:iss#] issue object numbers オブジェクト番号発行 (図15)

本コマンドは、プリンタ1からホスト装置2に対して送られる。本コマンドは、[o:req#]コマンドによる要求に対して、使用可能なオブジェクト番号を発行するためのものである。

【0049】N：本コマンドで発行するオブジェクト番号の数を示す。

【0050】#：印刷オブジェクトの設定のためにホス

ト装置2が使用可能なオブジェクト番号を示す。同時に複数のオブジェクト番号を発行する場合、(nobj#)で示した数の相異なるオブジェクト番号が続く。

(12) [o:mkim] make image object 画像オブジェクト設定 (図16, 図17, 図18および図19)

本コマンドは、ホスト装置2からプリンタ1に対して送られる。本コマンドは、画像印刷オブジェクトの設定を行うためのものである。[p:make]コマンドでページフォーマットの指定が行われていない場合は、本コマンドは無効となる。

【0051】#：[o:iss#]コマンドで発行されたオブジェクト番号の1つを選んで指定する。以後、該当する印刷オブジェクトに関する情報・画像データなどのホスト装置2とプリンタ1との間での情報の交換は、このオブジェクト番号を用いて行う。以下のような場合には、本コマンドは無効となる。

【0052】(i) オブジェクト番号が指定されていない。

【0053】(ii) [o:iss#]コマンドで発行されたオブジェクト番号以外のオブジェクト番号が指定された。

【0054】(iii) すでに[o:mkim]コマンドで設定されているオブジェクト番号が指定された。

【0055】D：以下のパラメータの分母を表す。

【0056】X, Y：ページ印刷領域の左上を原点として、オブジェクト展開領域の左上の位置を指定する。

【0057】

水平位置=(xpos)/(denomi) (inch)

垂直位置=(ypos)/(denomi) (inch)

denomiが指定されていない、または0が指定された場合は、xposおよびyposは[m:qlty]コマンドで指定されている解像度におけるドット数として扱う。また、ページ印刷領域以外の位置が指定された場合、オブジェクトの印刷は行われずに、[o:rles]コマンドでエラーが通知される。この場合、このオブジェクト番号は、再び[o:iss#]コマンドで発行されるまで使用できない。

【0058】なお、[p:make]コマンドで自動配置が指定された場合には、これらのパラメータは無視される。

【0059】W, H：オブジェクト展開領域の幅および長さを設定するためのものである。

【0060】

幅=(width)/(denomi) (inch)

長さ=(height)/(denomi) (inch)

denomiが指定されていない、または0が指定された場合は、widthおよびheightは[m:qlty]コマンドで指定されている解像度におけるドット数として扱う。また、ページ印刷領域からはみ出すような幅および長さが指定された場合、オブジェクトの印刷は行われずに、[o:rles]コマンドでエラーが通知される。この場合、このオブジェクト番号は、再び[o:iss#]コマンドで発行されるまで使用できない。

【0061】なお、[p:make]コマンドで自動配置が指定された場合には、これらのパラメータは無視される。

【0062】R：画像の回転方向を指定する。なお、“4”または“5”が指定された場合、プリンタ1が自身の能力に応じて決定することになる。

【0063】F：オブジェクト展開領域と画像データの縦横比が異なる場合の、サイズ調整方法を指定する。

【0064】“0”の場合、画像データががすべて紙面に現れるように印刷する。オブジェクト展開領域の左右または上下が余ることになる。画像の縦横比は保存される。

【0065】“1”の場合、オブジェクト展開領域がすべて埋め尽くされるように印刷する。画像データの左右または上下が切れることになる。画像の縦横比は保存される。

【0066】“2”の場合、画像データがオブジェクト展開領域にぴったり収まるように、画像の縦横比を変更して印刷する。

【0067】A：size fittingで“0”または“1”が指定された場合、上下および左右方向の配置を指定する。

【0068】Q：画像の展開処理を高速に行うため、可能であれば、画像データを間引いて展開するように指示する。解像度の低いデータを用いることになるため、印刷品質が低下する。また、リサイズにはTBDで指定したアルゴリズムを用いず、最も高速なリサイズアルゴリズムを用いる。

【0069】I：適切な色変換処理を行うために、画像の種別を指定する。ただし、画像データがインテント情報を含むフォーマットである場合には、intentによる指定は無視される。

【0070】Z：イメージデータのサイズをバイト数で指定する。プリンタ1が十分なメモリ領域を有している場合には、イメージデータをバッファリングすることにより、（特に画像を回転させる場合）高速に展開処理が行われる可能性がある。dtsizeが指定されていない場合、十分なメモリ領域を有している場合であっても、イメージデータのバッファリングは行われない。

【0071】P：APF（Auto Photo Fine）の設定を指定する。APFとは画質の調整を行うための処理である。上位バイトでAPF適用の有無、下位バイトでAPF適用項目が指定される。上位バイトが“1”の場合、印刷字野前に画像データをプリスキャンし、下位バイトで指定した項目の補正を行う。上位バイトが“2”の場合、パラメータS（statistical data）で送る画像統計値に基づいて、簡易APFを適用する。簡易APFは、コントラスト強調、彩度強調およびシャープネスを行う。この場合、画像データのプリスキャンは行われない。また、statistical dataのパラメータがない場合は、簡易APFは適用しない。なお、上位バイトが

“0”または“1”の場合、下位バイトは無視される。

【0072】S：簡易APFを適用するための画像データの統計データを順に送るためのものである。統計データは、最大値（YMAX, RMAX, GMAX, BMAX）、最小値（Ymin, Rmin, Gmin, Bmin）、標準偏差値（YST D, RSTD, GSTD, BSTD）および平均値（YAVR, RAVR, GAVR, BAVR）からなる。ここで、Yは1バイトで表される輝度であり、次式で示される。

【0073】

$$Y = (38 \times R + 76 \times G + 14 \times B) / 128$$

また、RGBは各色8ビットで表される。

【0074】T：切り取りガイド線の描画を指定する。枠線の描画と同時に指定した場合、枠線の描画指定は無効となる。各値は、denomiを分母とした値を指定する。例えば、

$$\text{水平方向オフセット} = OH / \text{denomi} \quad (\text{inch})$$

denomiが指定されていない場合または0が指定された場合は、値は[m:qlty]コマンドで指定されている解像度におけるドット数として扱う。

【0075】B：枠線の描画を指定する。ただし、切り取りガイド線の描画が指定されている場合は、枠線の描画指定は無効である。各値は、denomiを分母とした値を指定する。例えば、

$$\text{水平方向オフセット} = OH / \text{denomi} \quad (\text{inch})$$

denomiが指定されていない場合または0が指定された場合は、値は[m:qlty]コマンドで指定されている解像度におけるドット数として扱う。

【0076】“>”および“)”は、画像のキャプションの位置、サイズおよび色を指定する。指定されない場合は、キャプションは印刷されない。

【0077】offset：オブジェクト展開領域の端からの距離を指定する。

$$\text{距離} = \text{offset} / \text{denomi} \quad (\text{inch})$$

denomiが指定されていない場合または0が指定された場合は、値は[m:qlty]コマンドで指定されている解像度におけるドット数として扱う。

【0079】pos：位置と文字の向きを指定する。

【0080】P：画像に対する位置（0：上，1：下，2：右，3：左）

A：配置（0：左寄せ，1：中央，2：右寄せ）

I：文字の向き（0：正位置，1：逆転）

pitch：文字ピッチを指定する。

【0081】size：文字のサイズを指定する。

【0082】R,G,B：テキストの色をRGB各色8ビットで指定する。

【0083】<，（：キャプションの文字列をASCIIコードで指定する。48バイト固定長で、これよりも短い文字列を使用する場合は不要部分をヌルキャラクタで埋める。

（13）[o:rles] release object オブジェクト解放

(図 20)

本コマンドは、プリンタ 1 からホスト装置 2 に対して送られる。本コマンドは、印刷オブジェクトの処理が終了したことを通知するためのものである。

【0084】#：処理が終了した印刷オブジェクトのオブジェクト番号を示す。

【0085】S：処理終了の状態を示すためのものである。

(14) [o:dreq] data request データ要求 (図 2 1)

本コマンドは、プリンタ 1 からホスト装置 2 に対して送られる。本コマンドは、オブジェクトの画像データをホスト装置 2 に要求するためのものである。

【0086】#：データを要求する印刷オブジェクトのオブジェクトを指定する。

【0087】L：要求するデータ長を指定する。

【0088】ホスト装置 2 は、本コマンドを受信した場合、該当する印刷オブジェクトのデータを要求されたバイト数に従って[d:dsnd]コマンドで送信する。また、ホスト装置 2 は、送信できない場合には、[d:dsnd]コマンドでエラーを通知する。

(15) [d:dsnd] send data データ送信 (図 2 2)

本コマンドは、ホスト装置 2 からプリンタ 1 に対して送られる。本コマンドは、[d:dreq]コマンドで要求された画像データをプリンタ 1 に対して送信する。

【0089】#：データを送信する印刷オブジェクトのオブジェクト番号を指定する。

【0090】S：画像データの送信情報を示す。

【0091】+：送信するデータ長を示す。statusが“1”または“2”の場合で、データを送信できない場合は、dtlenは0とする。

【0092】なお、本コマンドに続くdtlenバイトのバイナリデータが画像データとして扱われる。

(16) [d:seek] seek データ読み出し位置変更 (図 2 3)

本コマンドは、プリンタ 1 からホスト装置 2 に対して送られる。本コマンドは、印刷オブジェクトのデータ読み出し位置の変更をホスト装置に要求するためのものである。

【0093】#：読み出し位置を変更する印刷オブジェクトのオブジェクト番号を指定する。

【0094】O：読み出し位置指定の基準を示す。

【0095】L：originからデータ読み出し位置までの距離を符号付きのバイト数で示す。

【0096】ホスト装置 2 は、[d:dreq]コマンドを受信した後、要求したデータを[d:dsnd]コマンドでプリンタ 1 に送信するまでの間に本コマンドを受信した場合、要求されたデータを送信した後に読み出し位置を変更する。

3 機能構成

次に、本実施形態に係るプリントシステムの機能構成について説明する。

3-1 プリンタの機能構成

図 24 は、プリンタ 1 の機能構成を示すブロックダイアグラムである。すなわち、同図は、図 2 に示したプリンタ 1 を機能的に表現したものである。同図に示すように、プリンタ 1 は、通信 I/F 部 241、コマンド解釈部 242、印刷設定処理部 243、固有情報記憶部 244、設定情報記憶部 245、印刷処理部 246 およびプリントエンジン部 246 を備える。

【0097】コマンド解釈部 242 は、通信 I/F 部 241 (図 2 の通信 I/F 28 に相当する。)を介してホスト装置 2 からコマンドデータを受け取ると、このコマンドデータに含まれるコマンドを解釈し、その解釈結果に応じた処理が行われるように制御する。印刷設定処理部 243 は、ホスト装置 2 との間で、定義されたコマンド体系に基づく通信によって、印刷設定に関する処理を進行させていく。印刷設定処理部 243 の詳細については後述する。固有情報記憶部 244 は、自身の仕様に関する情報 (以下「固有情報」という。)を記憶する。固有情報は、例えば、対応可能な解像度、対応可能な用紙サイズ、ページ有効範囲など、プリンタの機種ごとに定められた値である。印刷設定情報記憶部 245 は、ホスト装置 2 から送られる印刷設定要求に基づいて印刷設定処理部 244 が設定した印刷設定情報を記憶する。印刷処理部 246 は、コマンド解釈部 242 を介してホスト装置 2 から送られる印刷対象のデータ (印刷オブジェクト)を、印刷設定情報記憶部 245 に記憶された印刷設定情報に基づいて、ラスタ形式のビットマップデータに展開し、これをプリントエンジン部 246 (図 2 のプリントエンジン 27 に相当する。)に出力する。印刷処理部 246 の詳細については後述する。

【0098】図 25 は、印刷設定処理部 243 の機能構成を示すブロックダイアグラムである。同図において、印刷品質設定部 251 は、印刷品質設定に関するコマンドデータ ([m:qlty] コマンド) を処理する。印刷品質設定部 251 は、コマンドデータに含まれるパラメータユニットの内容に従い、固有情報記憶部 244 に記憶された固有情報を参照しながら、印刷品質に関する印刷設定情報を作成し、これを印刷設定情報記憶部 245 に出力する。つまり、ホスト装置 2 によって指定されるパラメータユニットの内容は絶対的なものではなく、プリンタ 1 の仕様に合うように変換され、印刷設定情報として出力される。例えば、画質を指定するパラメータ“Q”においては、1200dpi や 600dpi というように絶対的な値が指定されるのではなく、16段階の相対的な値で指定される。従って、最高画質を意味する“15”が指定された場合、1200dpi に対応可能なプリンタであれば、画質は 1200dpi に設定され、600dpi まで対応可能なプリンタであれば、画質は 6

00dpiに設定されることになる。

【0099】ページ有効範囲回答部252は、ページ有効範囲の問い合わせに関するコマンドデータ ([p:inqa] コマンド) を処理する。ページ有効範囲回答部252は、このコマンドデータを受け取ると、固有情報記憶部244に記憶された固有情報を参照して、設定可能なページ印刷領域の範囲を回答するためのコマンドデータ

(ページ有効範囲の回答に関するコマンドデータ ([p:rlpla] コマンド)) を作成する。作成されたコマンドデータは、通信I/F部241を介して、ホスト装置2に送られる。なお、ページ有効範囲回答部252は、このコマンドデータのパラメータユニットで係数“D”が指定されている場合、この係数に基づいて設定可能なページ印刷領域の範囲が回答される。

【0100】ページフォーマット定義部253は、ページフォーマット定義に関するコマンドデータ ([p:make] コマンド) を処理する。ページフォーマット定義部253は、このコマンドデータに含まれるパラメータユニットの内容に従って、ページ印刷領域のサイズや印刷オブジェクトの配置方法などのページフォーマットに関する印刷設定情報を作成し、これを印刷設定情報記憶部245に出力する。

【0101】オブジェクト番号発行部254は、オブジェクト番号の発行要求に関するコマンドデータ ([o:req#] コマンド) を処理する。オブジェクト番号は、印刷オブジェクトを個別に管理するためのものである。オブジェクト番号発行部254は、パラメータユニットで指定されたオブジェクト番号の数(要求するオブジェクト数)に対して、自身が同時に管理可能な数分のオブジェクト番号を回答するためのコマンドデータ(オブジェクト番号の発行に関するコマンドデータ ([o:iss#] コマンド)) を作成する。作成されたコマンドデータは、通信I/F部241を介して、ホスト装置2に送られる。

【0102】オブジェクト設定部255は、印刷オブジェクトの設定に関するコマンドデータ ([o:mkim] コマンド) を処理する。オブジェクト設定部255は、このコマンドデータに含まれるパラメータユニットの内容に従って、印刷オブジェクトの設定に関する印刷設定情報を作成し、これを印刷設定情報記憶部245に出力する。

【0103】ページ設定終了部256は、ページ設定の終了に関するコマンドデータ ([p:endp] コマンド) を処理する。ページ設定終了部256は、このコマンドデータを受け取ると、ページ設定の終了処理を行い、後述するオブジェクト要求部261にその旨を通知する。

【0104】図26は、印刷処理部46の機能構成を示すブロックダイアグラムである。同図において、オブジェクト要求部261は、印刷オブジェクトのデータをホスト装置2に対して要求するため、データ要求に関するコマンドデータ ([d:dreq] コマンド) を作成し、通信I/F部241に出力する。オブジェクト要求部261

は、印刷設定情報記憶部45に記憶された印刷設定情報に従って印刷オブジェクトを特定し、印刷オブジェクトごとにそのデータを要求する。この場合、オブジェクト要求部261は、要求するデータの長さ(バイト数)を指定する。つまり、オブジェクト要求部261は、作成された印刷設定情報に従って印刷ページ領域に配置される印刷オブジェクトをラスト順に特定し、その印刷オブジェクトに対して与えられるバッファの使用状況に応じて要求するデータ長を決定し、その印刷オブジェクトのオブジェクト番号を用いてホスト装置に要求する。

【0105】データ処理部262は、データ送信に関するコマンドデータ ([d:dsnd] コマンド) を処理する。すなわち、データ処理部262は、データ要求に関するコマンドデータに回答してホスト装置2から送られるデータ送信に関するコマンドデータに含まれる印刷オブジェクトのデータを、印刷設定情報記憶部45に記憶された印刷設定情報に従ってデータ処理モジュール263に処理させて、最終的に得られたラスト形式のビットマップデータをイメージメモリ264に出力する。本実施形態では、データ処理モジュール263は、画像展開部2631、解像度変換部2632、APF部2633および色変換部2634を備える。なお、データ処理部262は、印刷オブジェクトのデータをそれぞれ処理することができるよう、発行したオブジェクト番号の数分の作業領域(バッファ)を有し、また、そのデータをホスト装置2から何バイト取得したか、何バンド目まで展開したか、ビットマップデータの何ライン目まで展開したかに関する情報を記憶することが好ましい。

【0106】画像展開部2631は、圧縮形式で転送される印刷オブジェクトのデータを展開(伸長)して元の印刷オブジェクトのデータに復元する。解像度変換部2632は、復元された印刷オブジェクトのデータを印刷設定情報記憶部245に記憶された印刷設定情報に従い、解像度を変換する。例えば、[o:mkim] コマンドで2×3(inch)の展開領域が指定され、[m:qlty] コマンドで間接的に720(dpi)の解像度が指定されている場合、イメージサイズが1440×2160(dot)のビットマップデータを印刷することになる。しかしながら、ホスト装置2から送られる印刷オブジェクトのイメージサイズは必ずしもこのサイズではない。このため、ホスト装置2から送られる印刷オブジェクトが印刷すべきイメージサイズよりも小さい場合は、補完処理を行い、逆に、ホスト装置2から送られる印刷オブジェクトが印刷すべきイメージサイズよりも大きい場合は間引き処理を行う。これら補完処理および間引き処理をここでは解像度変換と呼ぶものとする。なお、[o:mkim] コマンドの“F”パラメータで、縦横比を変更することにより印刷オブジェクトが展開領域にちょうど収まるように指定された場合には、縦方向と横方向とで変換率(補完/間引き率)を変えて解像度変換を行う。APF部263

3は、印刷品質に関する印刷設定情報にAPF指定がある場合、その指定に従って画像の補正を行うものである。画像の補正には、例えば、トーン調整、彩度強調やシャープネスなどがある。また、画像の統計データを利用するものであってもよい。色変換部2634は、RGB各色8ビットで表現されるデータをCMYK各色8ビットで表現されるデータに変換する。この場合に、色変換部2634は、印刷設定情報に色変換のための参照テーブル(LUT)が指定されている場合には、これを参照する。

【0107】データ処理部262は、データ処理モジュール263に処理させて、印刷オブジェクトの展開を終了した場合には、その印刷オブジェクトのオブジェクト番号をオブジェクト解放部255に通知する。オブジェクト解放部255は、これを受けて、オブジェクト解放に関するコマンドデータ([o:rls]コマンド)を出力するとともに、その印刷オブジェクトを解放したことをオブジェクト番号発行部254に通知する。オブジェクト番号発行部254は、オブジェクト番号が解放されると、新たなオブジェクト番号を発行し、ホスト装置2に送る。これにより、ホスト装置2は、新たに発行されたオブジェクト番号に基づいて、印刷オブジェクトの設定を行うことができるようになる。

【0108】イメージメモリ264は、データ処理モジュール263によって処理されたラスタ形式のビットマップデータを記憶する。エンジン制御部266は、イメージメモリ264に記憶されたイメージデータをプリントエンジン部247に供給する。

3-2 ホスト装置の機能構成

図27は、ホスト装置2の機能構成を示すブロックダイアグラムである。すなわち、同図は、図3に示したホスト装置2を機能的に表現したものである。

【0109】印刷制御部271は、ユーザインターフェース部272(図3のユーザインターフェース34に相当する。)から与えられる印刷開始指示や印刷中断指示に従って、印刷の進行に関する制御を行う。印刷制御部271は、印刷の中断指示が与えられた場合、プリンタ1に対してページ処理中断に関するコマンドデータ([p:term]コマンド)を通信I/F部273に出力する。

【0110】印刷設定要求部274は、印刷仕様情報記憶部275を参照して、印刷仕様情報をパラメータユニットに含むコマンドデータ([m:qlty]コマンドなど)を作成し、通信I/F部273に出力する。印刷仕様情報は、印刷品質やページフォーマットに関する情報などを含む。印刷仕様情報は、予め設定され、またはユーザインターフェース部272から入力される。

【0111】コマンド解釈部276は、通信I/F部273を介してプリンタ1からコマンドデータを受け取り、このコマンドデータに含まれるコマンドを解釈し

て、その解釈結果に応じた処理が行われるように制御する。ファイルアクセス部277は、データ記憶部278をアクセスしてデータを書き込みまたは読み出すためのものである。ファイルアクセス部277は、データ要求に関するコマンドデータ([d:dreq]コマンド)を受け取ると、そのパラメータユニットで指定されている印刷オブジェクトのデータをデータ記憶部278から読み出して、これをパラメータユニットに含むデータ送信に関するコマンドデータ([d:dsnd]コマンド)を作成し、通信I/F部273に出力する。入力デバイス279は、ユーザI/F部272から与えられる入力指示に従って、取得したイメージデータをファイルアクセス部277を介してデータ記憶部278に記憶させる。

【0112】図28は、印刷設定要求部73の機能構成を示すブロックダイアグラムである。同図において、印刷品質設定要求部81は、印刷仕様情報記憶部74に記憶されている印刷仕様情報に基づいて印刷品質設定に関するコマンドデータを作成し、これを通信I/F部75に出力する。ページ有効範囲要求部82は、ページ有効範囲を問い合わせに関するコマンドデータを通信I/F部75に出力する。このコマンドデータに応答して、プリンタ1から送られるページ有効範囲の回答に関するコマンドデータ([p:rpla]コマンド)は、コマンド解釈部76を介してページフォーマット要求部83に入力される。ページフォーマット要求部83は、印刷仕様情報記憶部75に記憶された印刷仕様情報およびプリンタ1から取得したページ有効範囲に従ってページ印刷領域のサイズおよび配置方法などのページフォーマットに関するコマンドデータ([p:mak]コマンド)を作成する。オブジェクト番号要求部84は、印刷仕様情報記憶部75に記憶された印刷仕様情報に基づいて必要なオブジェクト番号をプリンタ1に要求するため、オブジェクト番号の発行要求に関するコマンドデータ([o:req#]コマンド)を出力する。このコマンドデータに応答してプリンタ1から送られるオブジェクト番号の発行に関するコマンドデータ([o:iss#]コマンド)は、オブジェクト設定要求部85に入力される。オブジェクト設定要求部85は、ページフォーマット要求部83によって設定されたページフォーマットに基づいて、印刷オブジェクトの設定に関するコマンドデータ([o:mkim]コマンド)を作成する。印刷オブジェクトの設定は、オブジェクト番号によって識別される印刷オブジェクトごとに行われる。ページ設定終了通知部86は、1ページ分([p:endp]コマンド)の印刷仕様の設定が終了したことをプリンタ1に通知するためのコマンドデータを作成する。

4 動作の説明

4-1 印刷設定処理

図29は、本実施形態に係るプリントシステムの印刷設定処理を説明するためのタイミングチャートである。

(1) ユーザから印刷開始指示が与えられると、ホスト

装置2は、印刷品質設定に関するコマンドデータをプリンタ1に送る。プリンタ1は、このコマンドデータを受け取り、自身の固有情報に従って、印刷品質に関する印刷設定情報を作成する。

(2) ホスト装置2は、ページ有効範囲の問い合わせに関するコマンドデータをプリンタ1に送る。

(3) プリンタ1は、このコマンドデータを受け取ると、ページ有効範囲の回答に関するコマンドデータをホスト装置2に送る。

(4) ホスト装置2は、ページ有効範囲について回答を受け取ると、このページ有効範囲に基づいてページフォーマットを作成し、ページフォーマットに関するコマンドデータをプリンタ1に送る。プリンタ1は、このコマンドデータを受け取り、ページフォーマットに関する印刷設定情報を作成する。

(5) ホスト装置2は、プリンタ1にページフォーマットを要求した後、印刷オブジェクトの印刷に必要なオブジェクト番号の発行を要求するため、オブジェクト番号の発行要求に関するコマンドデータをプリンタ1に送る。

(6) プリンタ1は、オブジェクト番号の発行要求に関するコマンドデータを受け取ると、自身で同時に扱うことができるオブジェクト番号をホスト装置2に通知するため、オブジェクト番号の発行に関するコマンドデータをホスト装置2に送る。

(7) ホスト装置2は、プリンタ1によって許可されたオブジェクト番号に従い、印刷オブジェクトのそれぞれについてオブジェクト設定に関するコマンドデータをプリンタ1に送る。

(8) ホスト装置2は、印刷オブジェクトのそれぞれについて設定をプリンタ1に通知することにより、1ページ分の設定が終了すると、ページ設定終了に関するコマンドデータをプリンタ1に送る。プリンタ1は、このコマンドデータを受け取ることによって、次のデータ転送・印刷処理を開始する。

4-2 データ転送・印刷処理

図30は、本実施形態に係るプリントシステムのデータ転送処理を説明するためのタイミングチャートである。

(1) プリンタ1は、ページ設定終了に関するコマンドデータを受け取ると、印刷オブジェクトのデータを要求するため、データ要求に関するコマンドデータをホスト装置2に送る。

(2) ホスト装置2は、データ要求に関するコマンドデータを受け取ると、パラメータデータの指定に従って印刷オブジェクトのデータを読み出して、データ送信に関するコマンドデータをプリンタ1に送る。

(3) ホスト装置2は、ユーザの指示やエラー発生などによりページ処理中断に関するコマンドデータをプリンタ1に送る。プリンタ1は、印刷処理(展開処理を含む。)をしている場合には、その処理を中断する。

(4) プリンタ1は、全ての印刷オブジェクトについて、オブジェクト解放に関するコマンドデータをホスト装置2に出力する。

(5) プリンタ1は、全ての印刷オブジェクトについて処理が中断したことをホスト装置2に通知するため、ページ処理終了に関するコマンドデータをホスト装置2に送る。

【0113】上記実施形態は、本発明を説明するための例示であり、本発明をこれらの実施形態にのみ限定する趣旨ではない。本発明は、その要旨を逸脱しない限り、さまざまな形態で実施することができる。例えば、上記機能実現手段の動作をシーケンシャルに説明したが、特にこれにこだわるものではない。従って、動作に矛盾が生じない限り、処理の順序を入れ替えまたは並行動作するように構成しても良い。

【発明の効果】本発明によれば、ホスト装置が従来のようなプリンタドライバを必要とすることなく、ホスト装置上のドキュメントデータをプリンタに印刷させることができるようになる。従って、コンピュータを介することなく、安価なホスト装置からプリンタに対して直接的に印刷を行わせることができるようになる。

【図面の簡単な説明】

【図1】プリントシステムの概略構成を示す図

【図2】プリンタのハードウェア構成を示す図

【図3】ホスト装置のハードウェア構成を示す図

【図4】コマンドの概略を説明するための図

【図5】印刷品質設定コマンドを説明するための図

【図6】印刷品質設定コマンドを説明するための図

【図7】ユーザ定義LUT設定コマンドを説明するための図

【図8】ページ有効範囲問い合わせコマンドを説明するための図

【図9】ページ有効範囲回答コマンドを説明するための図

【図10】ページフォーマット定義コマンドを説明するための図

【図11】ページ処理終了コマンドを説明するための図

【図12】オブジェクト番号要求コマンドを説明するための図

【図13】ページ設定終了コマンドを説明するための図

【図14】ページ処理中断コマンドを説明するための図

【図15】オブジェクト番号発行コマンドを説明するための図

【図16】画像オブジェクト設定コマンドを説明するための図

【図17】画像オブジェクト設定コマンドを説明するための図

【図18】画像オブジェクト設定コマンドを説明するための図

【図19】画像オブジェクト設定コマンドを説明するた

めの図

【図20】オブジェクト解放コマンドを説明するための図

【図21】データ要求コマンドを説明するための図

【図22】データ送信コマンドを説明するための図

【図23】データ読み出し位置変更コマンドを説明するための図

【図24】プリンタの機能構成を示すブロックダイアグラム

【図25】印刷設定処理部の機能構成を示すブロックダイアグラム

【図26】印刷処理部の機能構成を示すブロックダイアグラム

【図27】ホスト装置の機能構成を示すブロックダイアグラム

【図28】印刷設定要求部の機能構成を示すブロックダイアグラム

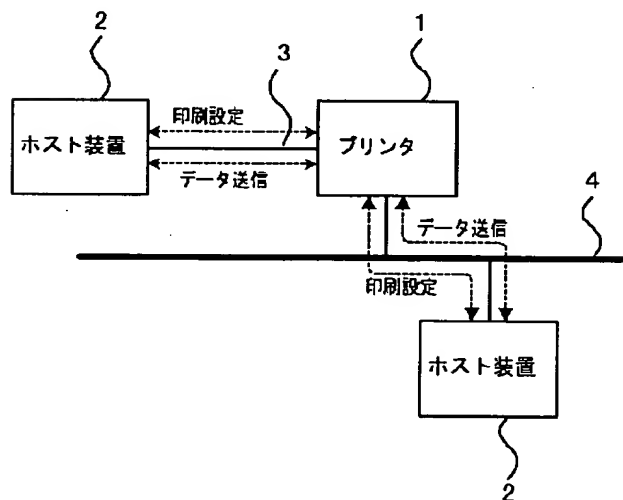
【図29】プリントシステムの印刷設定処理を説明するためのタイミングチャート

【図30】プリントシステムのデータ転送処理を説明するためのタイミングチャート

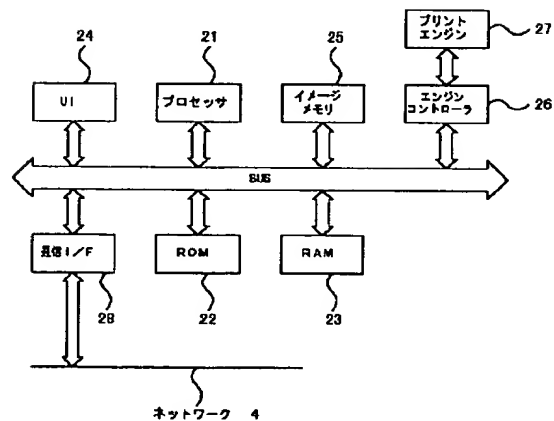
【符号の説明】

- 1…プリンタ
- 2…ホスト装置
- 3…パラレルケーブル
- 4…ネットワーク
- 2 4 1…通信インターフェース部
- 2 4 2…コマンド解釈部
- 2 4 3…印刷設定処理部
- 2 4 4…固有情報記憶部
- 2 4 5…印刷設定情報記憶部
- 2 4 6…印刷処理部
- 2 4 7…プリントエンジン
- 2 7 1…印刷制御部
- 2 7 2…ユーザインターフェース部
- 2 7 3…通信インターフェース部
- 2 7 4…印刷設定要求部
- 2 7 5…印刷仕様情報記憶部
- 2 7 6…コマンド解釈部
- 2 7 7…ファイルアクセス部
- 2 7 8…データ記憶部
- 2 7 9…入力デバイス部

【図1】



【図2】



【図8】

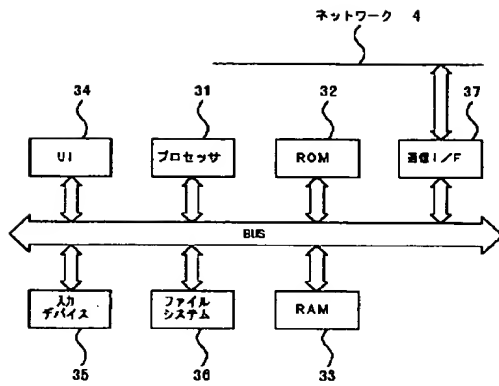
[p:inqa] Inquire page availability

host -> printer

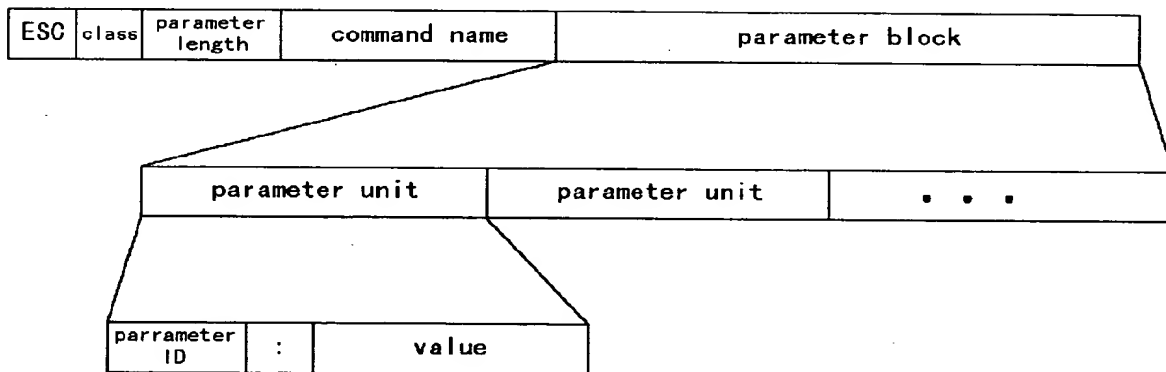
param. ID	value length	contents
--------------	-----------------	----------

0 2 denominator (denomi)

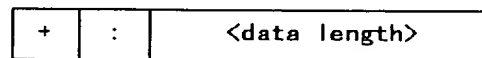
【図3】



【図4】



(a)



(b)

【図12】

[p:req#] request object numbers host → printer

param. ID	value length	contents
--------------	-----------------	----------

N 2 number of object numbers (nobj)

【図6】

W	1	micro weave (mcrwev)						
<table><tr><td>0</td><td>マイクロウィーブOFF</td></tr><tr><td>1</td><td>標準マイクロウィーブ</td></tr><tr><td>2-265</td><td>拡張マイクロウィーブ</td></tr></table>			0	マイクロウィーブOFF	1	標準マイクロウィーブ	2-265	拡張マイクロウィーブ
0	マイクロウィーブOFF							
1	標準マイクロウィーブ							
2-265	拡張マイクロウィーブ							

D	1	printing direction control (directl)						
<table><tr><td>0</td><td>双方向印刷</td></tr><tr><td>1</td><td>単方向印刷</td></tr></table>			0	双方向印刷	1	単方向印刷		
0	双方向印刷							
1	単方向印刷							

H	1	halftone (hftone)						
<table><tr><td>0</td><td>ディザ (高速)</td></tr><tr><td>1</td><td>誤差拡散 (高画質)</td></tr></table>			0	ディザ (高速)	1	誤差拡散 (高画質)		
0	ディザ (高速)							
1	誤差拡散 (高画質)							

Z	1	dot size (dotsz)						

H	2	horizontal resolution (hres)						
V	2	vertical resolution (vres)						

L	2	ID of user defined LUT (lut-id)						

【図7】

[m:slut] set user defined LUT

host -> printer

param. ID	value length	contents
--------------	-----------------	----------

I	2	ID (id)
---	---	---------

+	4	data length (dtlen)
---	---	---------------------

【図9】

[p:rpla] reply page availability host ← printer

param. ID	value length	contents
D	2	denominator (denomi)
W	4	maximum width (width)
H	4	maximum height (height)
T	4	minimum top margin (tmrgin)
L	4	left margin (lmrgin)
R	4	minimum right margin (rmrgin)
B	4	minimum bottom margin (bmrgin)

【図11】

[p:fini] page finished host ← printer

param. ID	value length	contents
S	2	Status (status)

0	正常終了
1	異常終了
2	[p:term]による中断
3	処理終了後に[p:term]を受信

【図15】

[o:iss#] issue object numbers host ← printer

param. ID	value length	contents
N	2	number of object numbers (nobj#)
#	2	object number (obj#)

【図10】

[p:make] make page

host -> printer

param. ID	value length	contents						
D	2	denominator (denomi)						
W	4	width (width)						
H	4	height (height)						
T	4	top margin (tmrgin)						
A	1	arrangement						
<table><tr><td>0</td><td>自動配置</td></tr><tr><td>1</td><td>個別指定</td></tr><tr><td>2</td><td>垂直方向直列配置</td></tr></table>			0	自動配置	1	個別指定	2	垂直方向直列配置
0	自動配置							
1	個別指定							
2	垂直方向直列配置							
H	2	horizontal division (hdiv)						
V	2	vertical division (hdiv)						
X	1	horizontal padding ratio (hpadd)						
Y	1	vertical padding ratio (vpadd)						

【図13】

[p:endp] end of page

host -> printer

param. ID	value length	contents
S	1	eject (eject)

0	印刷終了後に排紙しない
1	印刷終了後に排紙する

【図14】

[p:term] terminate page host → printer

param. ID	value length	contents
--------------	-----------------	----------

E 1 eject (eject)

0	中断後に排紙しない
1	中断後に排紙する

【図16】

[o:mkim] make image object host → printer

param. ID	value length	contents
--------------	-----------------	----------

2 object number (obj#)

D 2 denominator (denomi)

X 4 horizontal position (xpos)

Y 4 vertical position (ypos)

W 4 printing area width (width)

H 4 printing area height (height)

R 1 rotate (rotate)

0	回転なし
1	時計方向に90度
2	180度
3	反時計方向に90度
4	回転なしまたは時計方向に90度
5	回転なしまたは反時計方向に90度

F 1 aspect fitting (aspfit)

0	画像データに合わせる
1	オブジェクト展開領域に合わせる
2	画像データ、オブジェクト展開領域とも合わせる

【図17】

A 2 alignment (align)

上位バイト：上下方向配置

0	上端を合わせる
1	中央を合わせる
2	下端を合わせる

下位バイト：左右方向配置

0	左端を合わせる
1	中央を合わせる
2	右端を合わせる

Q 1 quick decoding (quick)

0	高速展開を行わない
1	高速展開を行う

I 1 intent (intent)

0	写真
1	テキスト/グラフ

Z 4 size of image data (dtsize)

【図20】

[o:rls] release object

host <- printer

param. ID	value length	contents
--------------	-----------------	----------

2 object number (obj#)

S 2 status (status)

0	正常終了
1	異常終了
2	ページ処理中断による終了

【図18】

P 2 photo creation (photor)

0	APFを適用しない
1	APFを適用する
2	簡易APFを適用する

下位バイト：APF適用項目

-	MH	MS	MG	S	D	T
---	----	----	----	---	---	---

T：トーン（0：標準、1：硬調、2：セピア調）

D：デジタルカメラ用補正

S：シャープネス（0：オフ、1：オン）

MG：記憶色補正・緑（0：オフ、1：オン）

MS：記憶色補正・空（0：オフ、1：オン）

MH：記憶色補正・肌色（0：オフ、1：オン）

S 16 statisical data (stsdatt)

T 12 trimming guide (trimgd)

OH	OV	TH	TV
L	W		

OH：水平方向オフセット

OV：垂直方向オフセット

TH：水平方向トリム量（符号付き）

TV：垂直方向トリム量（符号付き）

L：長さ

W：太さ

B 6 border line

OH	OV	W
----	----	---

OH：水平方向オフセット

OV：垂直方向オフセット

W：太さ

【図 19】

B 6 border line

OH	OV	W
----	----	---

OH: 水平方向オフセット

0V: 垂直方向オフセット

W : 太さ

```
> 9 style of caption 1 (style1)
```

```
)      9      style of caption 2 (style2)
```

offset	pos	pitch	size	R	G	B
--------	-----	-------	------	---	---	---

-	-	-	-	I	A	P
---	---	---	---	---	---	---

```
< 48      text string of caption 1 (str1)
```

```
(      48      text string of caption 2 (str2)
```

【図 2 1】

[d:dreq] data request

```
host <- printer
```

param. ID	value length	contents
--------------	-----------------	----------

```
#      2      object number (obj#)
```

```
L      4      requested length (reqlen)
```


【図22】

[o:dsnd] send data

host -> printer

param. ID	value length	contents						
#	2	object number (obj#)						
S	2	status (status)						
<table border="1"><tbody><tr><td>0</td><td>正常</td></tr><tr><td>1</td><td>EOF</td></tr><tr><td>2</td><td>データ要求のオブジェクト番号が不正</td></tr></tbody></table>			0	正常	1	EOF	2	データ要求のオブジェクト番号が不正
0	正常							
1	EOF							
2	データ要求のオブジェクト番号が不正							
+	4	data length (dtlen)						

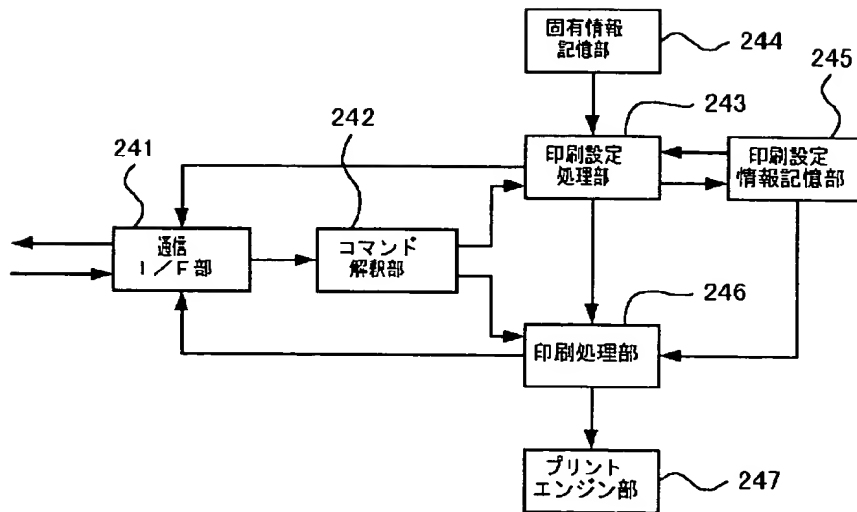
【図23】

[o:seek] seek

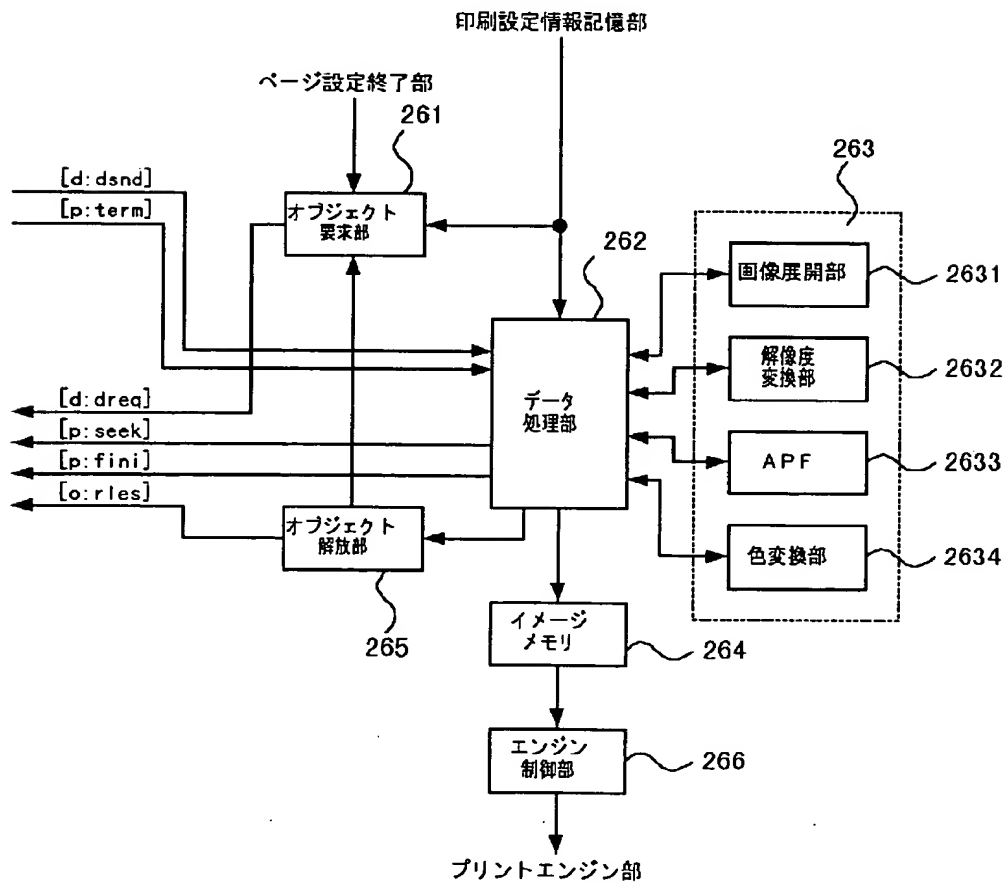
host <- printer

param. ID	value length	contents						
<hr/>								
#	2	object number (obj#)						
<hr/>								
0	2	origin (origin)						
<table><tr><td>0</td><td>データの先頭</td></tr><tr><td>1</td><td>現在の読み出し位置</td></tr><tr><td>2</td><td>データの終端</td></tr></table>			0	データの先頭	1	現在の読み出し位置	2	データの終端
0	データの先頭							
1	現在の読み出し位置							
2	データの終端							
<hr/>								
L	4	offset						

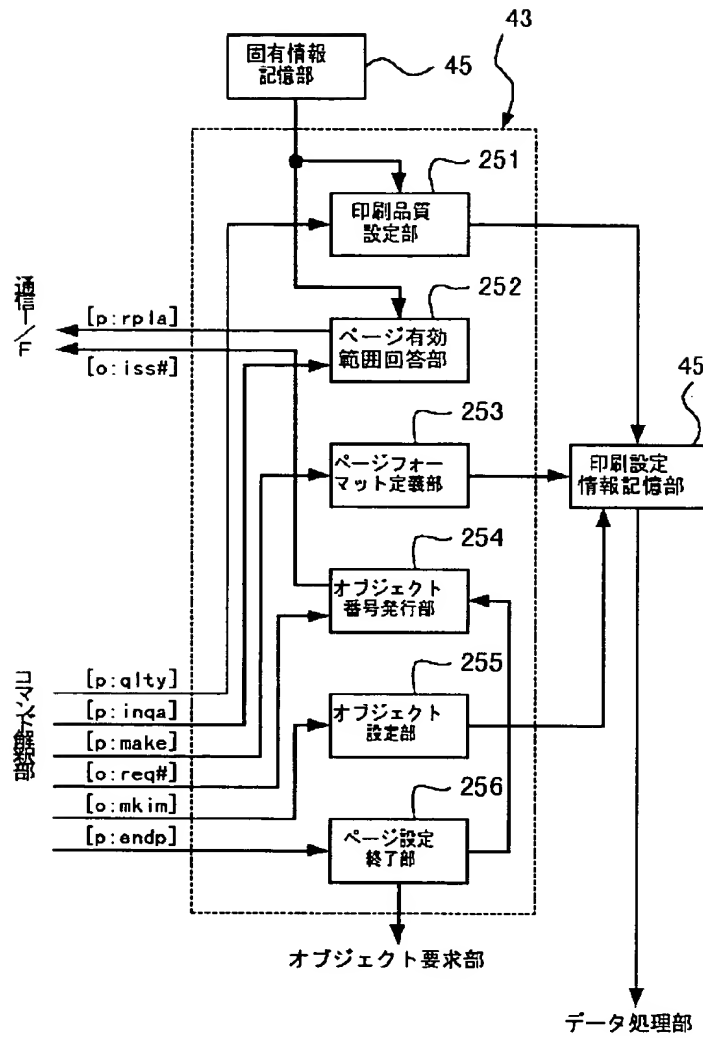
【図 24】



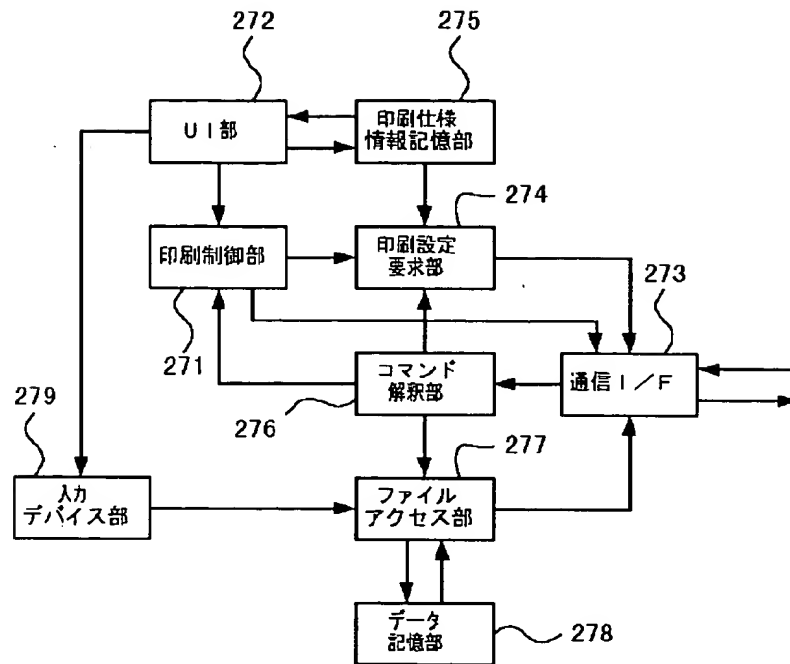
【図 26】



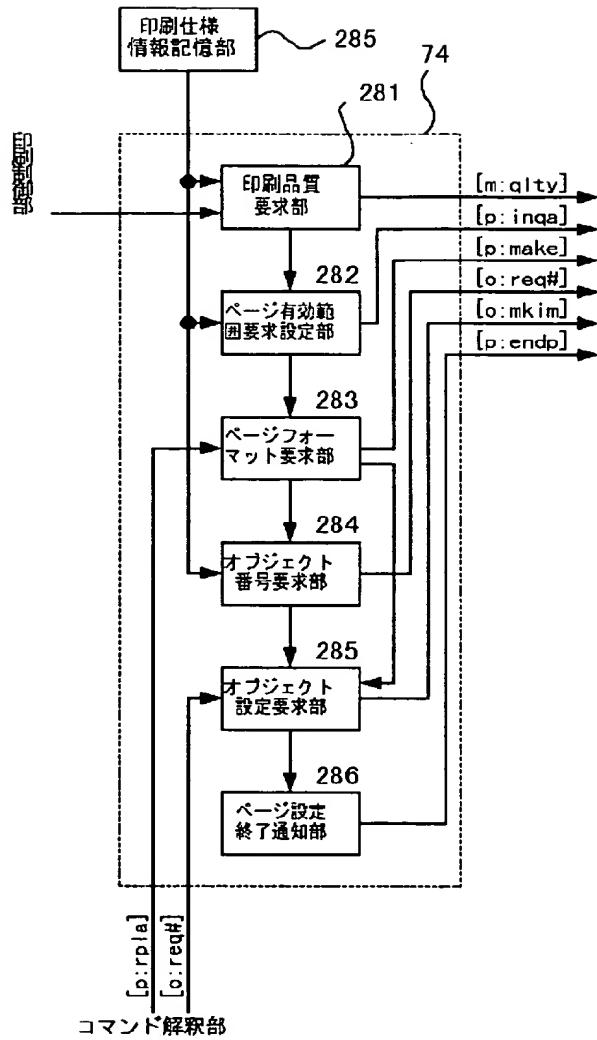
【図25】



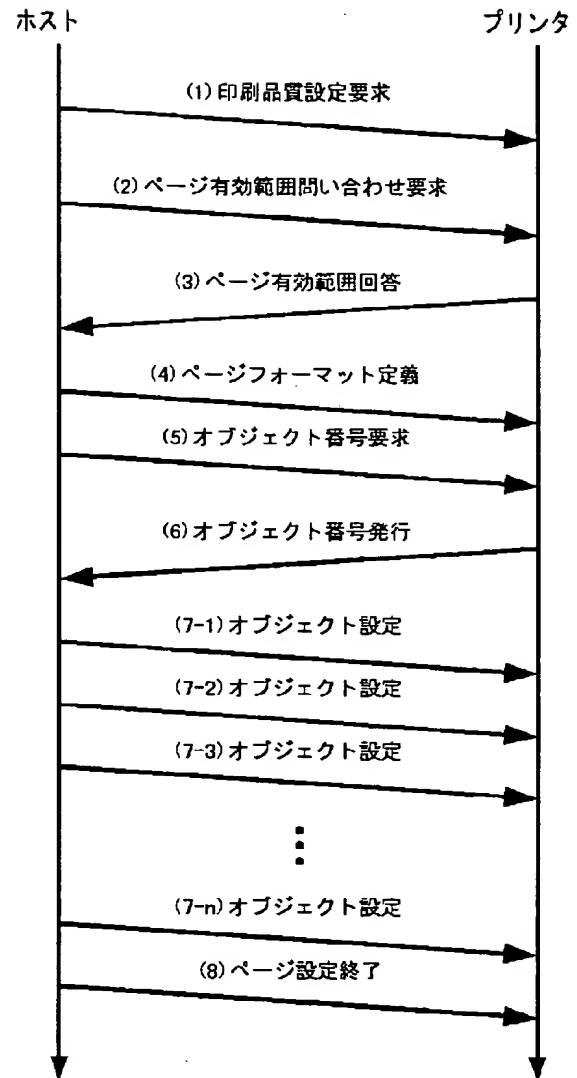
【図 27】



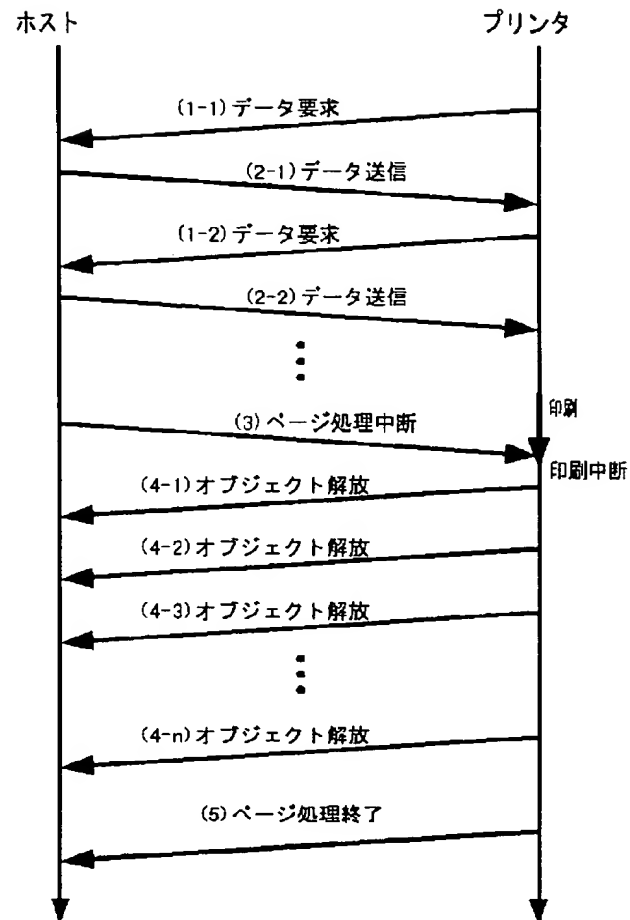
【図28】



【図29】



【図 30】



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